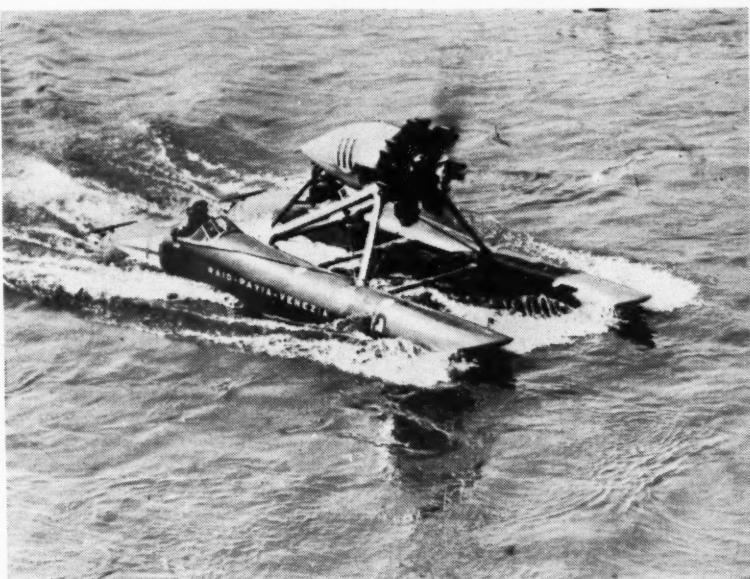


JUL 10 1939

# MOTOR AGE

A CHILTON PUBLICATION

DEVOTED TO THE INTERESTS OF THE INDEPENDENT SERVICE STATION



This unique craft, appearing like a seaplane which has shed fuselage and wings, is owned by Commander Gorini, of Italy. This special "Idroscivolante" recently won a 280-mile speedboat race from Pavia to Venice.

JULY  
1939

Among the interesting material in this issue we call to your attention a picture story on servicing the Gemmer steering gear and a valve story. Those of you who found last month's Diesel service story interesting and helpful will be glad to know a story on Diesel injector maintenance may be found on page 14 of this issue. We're sure you'll find it profitable, too, to read the merchandising stories herein.

# TOUGH

but

Oh so Gentle

TOUGH ON OIL PUMPING

GENTLE ON CYLINDER WALLS

★ Out goes oil pumping—down goes cylinder wear—when Steel-Vents are installed. That's because of Steel-Vent's\* amazing ability to control oil in the most extreme cases of cylinder taper (up to .025) ... yet at the same time hold cylinder wear to a minimum.

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Stan Elman



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filter**



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in an attractive  
counter display  
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## -these IMPERIAL PRODUCTS

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### Compression, S.A.E. Flare, Inverted Flare and Pipe Fittings

"Useful Information on Brass Fittings" is the title of Booklet No. 295 that covers fittings for every type of tubing work. Booklet shows how each type of fitting operates and includes a selection chart giving complete information on prices and sizes.

### Adda-Drawer Fitting Assortments

These assortments enable dealers and repair shops to have an economical assortment of the most popular sizes of compression, S. A. E., inverted flare, brass pipe and Hi-Duty fittings. Booklet No. 289 shows details of various assortments with prices.

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1217 W. Harrison St., Chicago, Ill.

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*Aids for Service Work*

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BY  
JOBBERS  
EVERWHERE

# MOTOR AGE

DEVOTED TO THE INTERESTS OF THE INDEPENDENT SERVICE STATION

Subscriptions for Motor Age are accepted only from independent repair shops and their employees.

Vol. LVIII, No. 8

July, 1939

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Offices: Philadelphia, Phone Sherwood 1424, New York City, 239 W. 39th Street, Phone Pennsylvania 6-1100; Chicago, Room 916, London Guarantee & Accident Bldg., Phone Franklin 4243; Detroit, 1015 Stephenson Bldg., Phone Madison 2090; Cleveland, 609 Guardian Bldg., Phone Cherry 4188; Washington, D. C., 1061 National Press Bldg., Phone District 6377; San Francisco, 444 Market Street, Room 595, Phone Garfield 6788; Long Beach, Calif., 1595 Pacific Ave., Phone Long Beach 618-238. Subscription Price: United States and Possessions, Latin-American Countries, \$2.00 per year; Canada and foreign, \$3.00 per year. Single copies, 25c.

Owned and Published by



CHILTON COMPANY  
(Incorporated)

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Chestnut and 56th Streets, Philadelphia, U. S. A.

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# MOTOR AGE

JULY 1939

## SHOP TALK

### Not All Crazy

Cliff Woodbury, ex-race driver and now operator of a shop in Chicago is certainly hot around the collar and with considerable cause. It seems that some newspaper reporter interviewed Cliff and then seriously misquoted his remarks. The newspaper account of the interview stated that Cliff thought all race drivers were crazy and that his fourteen years of racing had been hell. Cliff in his letter to me gave a résumé of the interview and to say that he was misquoted would be putting it mildly. However I'm sure that Cliff's friends know him well enough to discount that newspaper article 100 per cent.

### Stock Cars

Just finished a session with Joe Dawson and Herb Lockhart trying to decide what is a stock car. The discussion arose in connection with the stock car race being held at the Langhorne, Pa., track on July Fourth. Off hand it would seem to be a simple thing, but when some manufacturers supply high compression head, optional gear ratios, etc., it soon becomes rather complicated. One of the cases discussed was the so-called "mountain head" supplied by Ford. This is optional equipment but at extra cost. I had to leave before a decision was reached. But it's a tough proposition trying to be judge and jury and be fair to all the entrants.

### Hopped Down

Speaking of racing, there has been a big increase in the number of letters asking for the dope on



how to hop up various makes of cars. There always is an increase in that type of letter during the spring months, but this year it is bigger than ever. Personally I seldom get above 50 m.p.h. There are too many State cops on the roads I travel. So many that it looks as though all the deserving politicians had been put in uniform and sent out on the highways.

### On Its Way

E. Pierce, from Lockwood, Texas, is another man who is not only hot around the collar but plain down-right angry. "Why in Hell do I have to do without my May issue every year?" he writes, "If I did not want your very valuable magazine I

would not order and pay for same—so get on your toes and send me my May issue!" OK Mister, we are on our toes—your May issue is in the mail—and I don't blame you for being sore. I think MOTOR AGE is a pretty good magazine too!

### He'll Be Back

A letter from my old friend Don Herr gave me some surprising news. He has sold his shop in Indianapolis. It was one of the biggest in that city and Don did a lot of business. His plans are uncertain, but my guess is that he will stay in the automotive industry.

*Be back*

# Servicing the



**Worm and Sector Type  
as used on 1936 Ford**

1—Remove nuts holding sector shaft housing in place.

2—Remove sector shaft housing.

3—Remove sector shaft.

4—Examine needle bearings and oil seal in sector shaft housing. Check sector shaft bearing surfaces and sector teeth. If these parts show any wear they should be replaced.

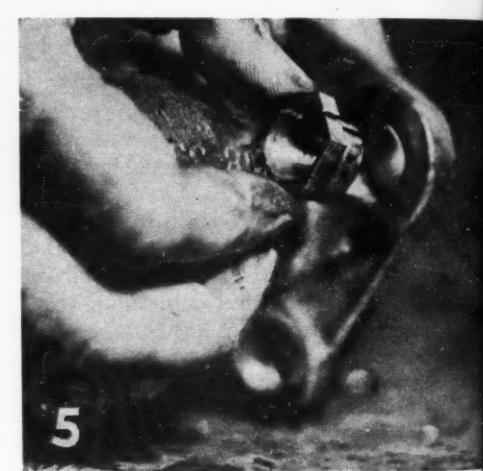
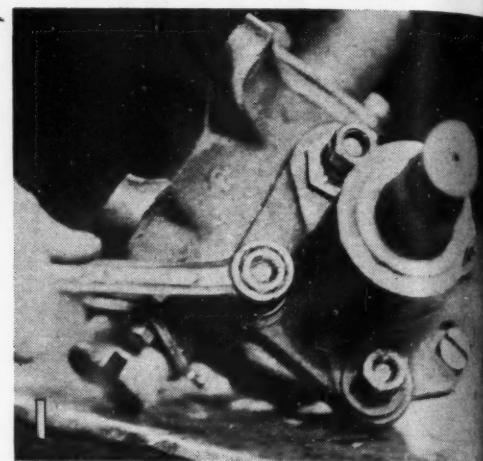
5—This view shows eccentric adjusting sleeve. Make sure this sleeve turns freely in bolt hole in sector shaft housing.

6—In most cases it is not necessary

to adjust eccentric rivet. This rivet should only be adjusted when the lash is unequal with the steering wheel at a point  $1/3$  turn from the mid-position in either direction.

To make this adjustment proceed as follows:

A—Set the sector shaft teeth in the mid-position of the worm gear. To find this point, turn the steering wheel in either direction to the full extent of its travel. Then, turn the wheel in the opposite direction, counting the turns of the wheel to its extreme position.



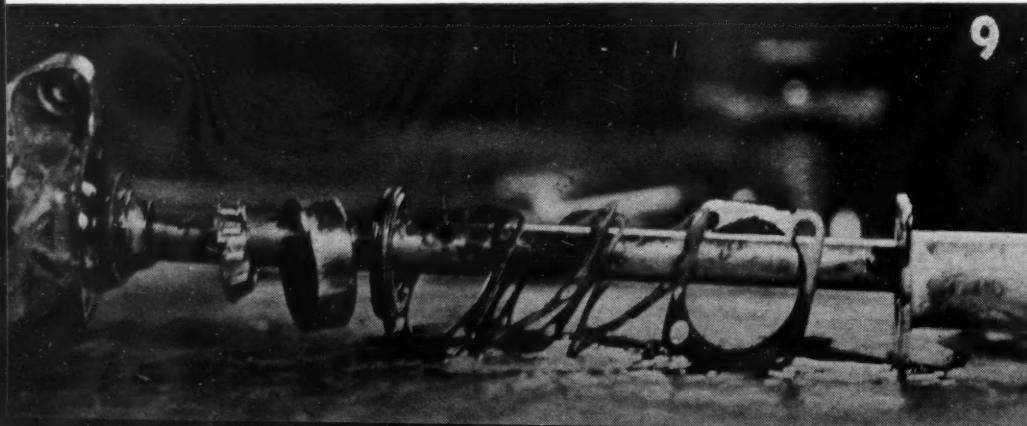
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Then, turn wheel back to a point one half the total number of turns previously counted.

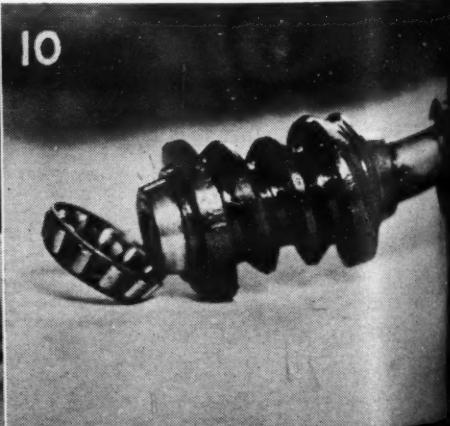
B—Now turn steering wheel  $1/3$  turn to the right or clockwise. At this point note the amount of lash between the gear teeth by shaking pitman arm.

C—Turn steering wheel in the opposite direction  $2/3$  of a turn and note lash between gear teeth at this point.

D—If the lash between gear teeth at these two points is not the same and is greater when steering wheel is turned to the right or clockwise posi-

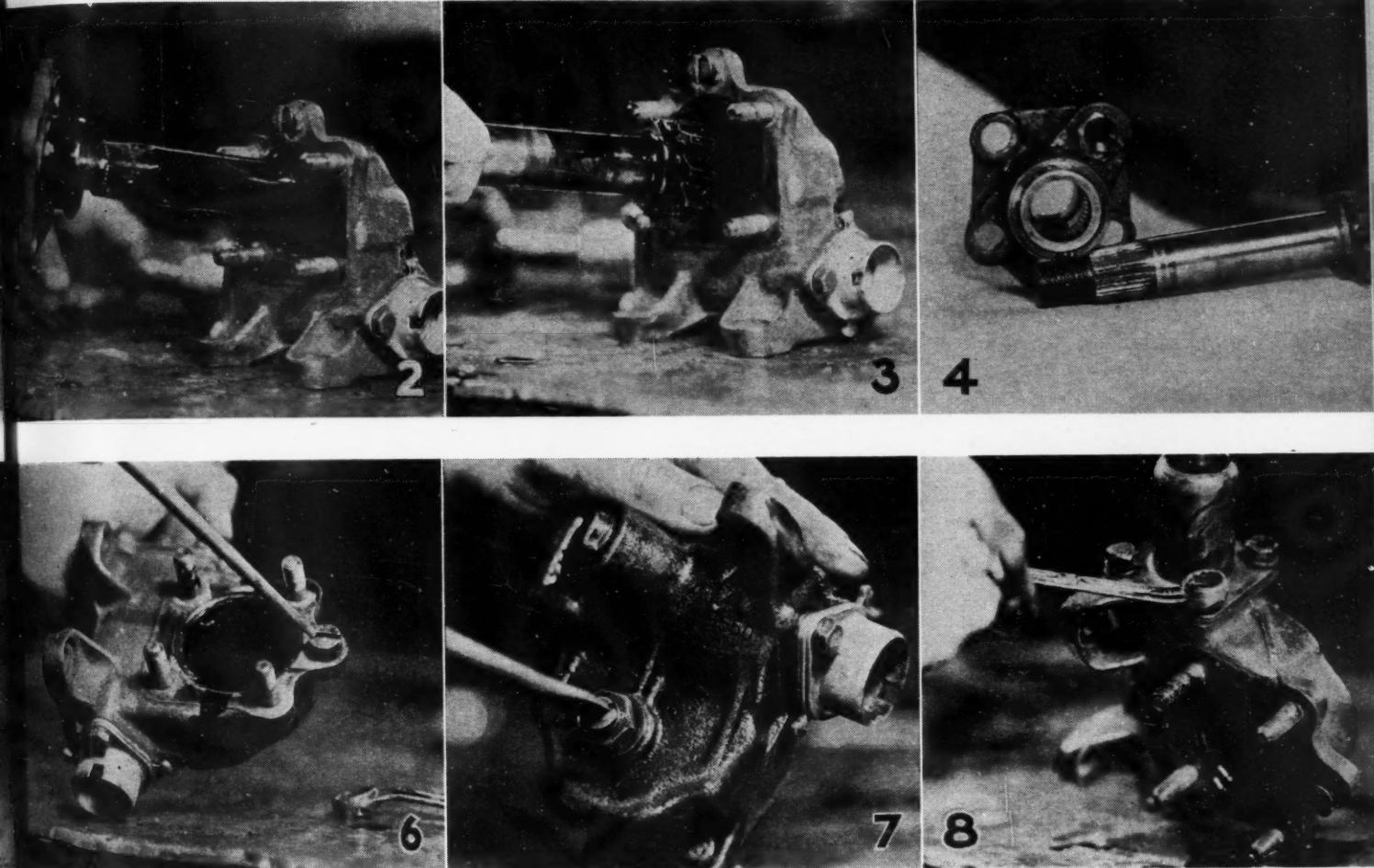


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10

# Gemmer Steering Gear



ton, the eccentric rivet should be turned in a clockwise direction. If the lash is greater when the steering wheel is in the left or counter-clockwise position, turn the eccentric rivet in the counter-clockwise direction.

7—This adjustment controls end-play in the sector shaft and should only be tight enough to remove all end motion but not cause any binding.

8—Remove nuts holding housing upper cover.

9—Slide upper cover, shims, bearing and worm out of housing.

10—Examine bearings and worm for roughness or damage.

11—Remove housing lower cover and examine worm lower bearing race for roughness.

12—Replace column jacket upper bushing to eliminate steering wheel rattle.

#### ADJUSTMENTS:

A—Up and down movement of the worm shaft is controlled by removing or adding shims under the upper housing cover.

B—Sector shaft end-play is controlled by adjusting screw shown in Fig. 7.

C—Clearance between worm and sector teeth is accomplished by loosening the four nuts, each  $\frac{1}{4}$  turn, that hold the sector shaft housing to the main body and moving eccentric sleeve very gradually in a clockwise direction until lash can just be felt at the end of pitman arm. When making this adjustment, the steering wheel must be turned to its mid-position of travel.

D—Eccentric rivet: Adjust according to directions outlined under Fig. 6.

By

**BOB TURNER**



# Don't Forget Valves



MANY mechanics seem to overlook the fact that while new valve steels and the use of hardened valve seat inserts have undoubtedly prolonged the period between valve "grinds," the fact remains that valves and seats do have to be reconditioned in order to obtain peak performance and economy.

The first step in any tune-up job should, therefore, be a compression check of each cylinder, for no amount of tuning will make an engine run smoothly and economically unless the compression in each cylinder is up to standard. Furthermore, a valve and seat reconditioning job is of particular importance and value on new cars that have traveled up to 10,000 miles.

The reason for this is that while hardened valve seats do not ordinarily pit, corrode or carbonize, the cast-iron around these inserts warps or takes a new setting as the block becomes seasoned. This results in tilting the valve seat which, of course, causes a drop in compression, reduced fuel economy and poor acceleration. Repair shops should, therefore, make a point of selling a carbon and valve job to owners of new cars when the mileage has reached approximately 10,000 miles. This will mean many thousand more miles of satisfactory service.

When it comes to reconditioning the valves and seats, the mechanic must remember that there is a lot more knowledge covering valves and seats than existed only a few years ago. Formerly it was common practice to make the valves seats about .050 in. to .060 in. wide,

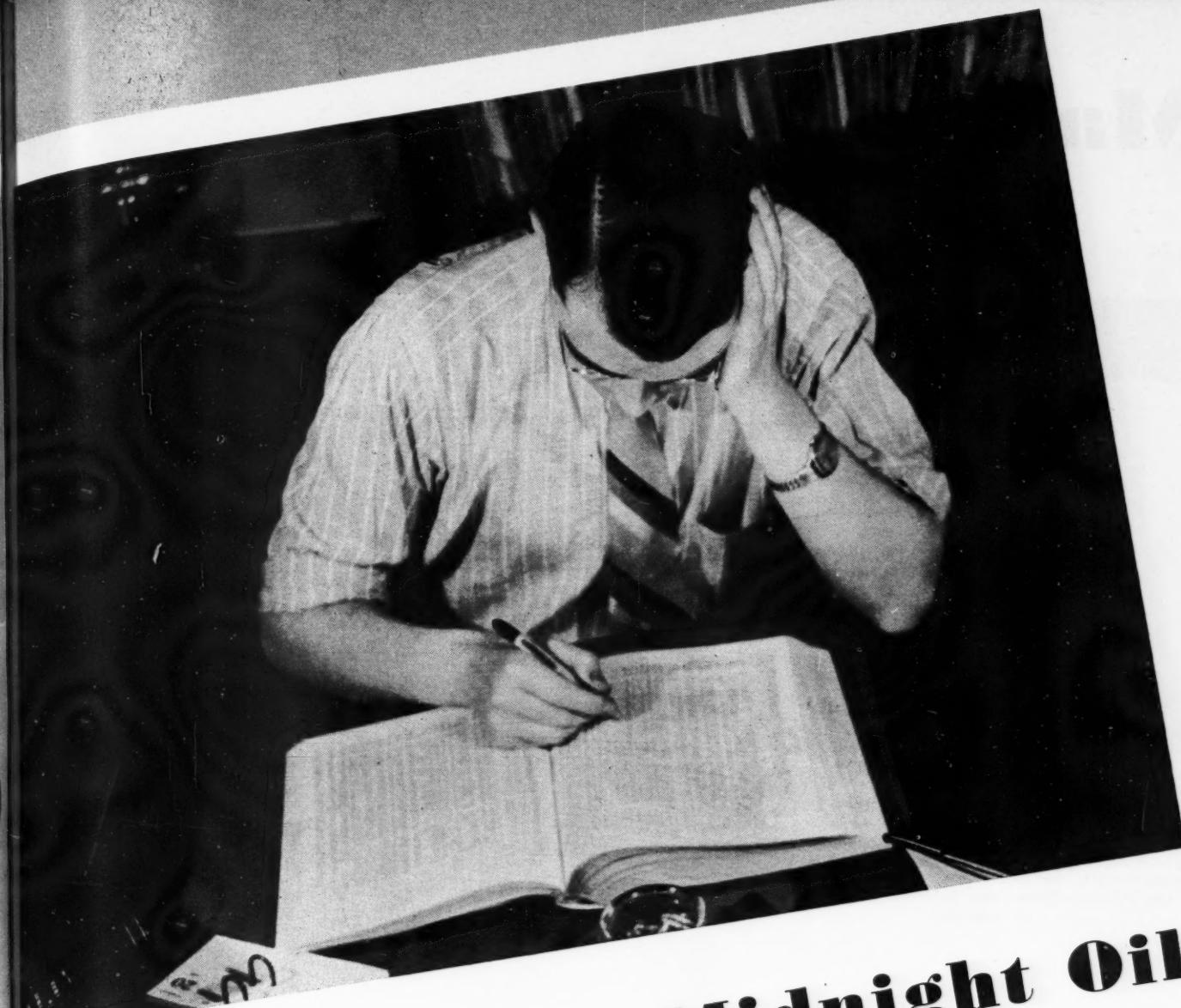
the theory being that they would bed in quickly, making a true contact. In addition, the narrow seat would cut through any carbon that might collect on the valve or seat.

While a narrow seat will bed in more quickly than a wide seat, there are other factors that are more important. On narrow exhaust seats, the high flame temperature passing over the seats would burn the carbon out of the cast-iron and they would quickly become porous and hammered down so that there would be little or no clearance at the tappet. This re-

sults in burned valves and lost compression. In other words, the life of a narrow seat is much shorter than a wide seat.

Valve seats having a width of .090 in. to .010 in. have a proportionately longer life than the narrow seat. This is not only because they have greater resistance to the hammering action of the valve, but also because the greater seat area will keep the valve cooler. The reason for this is that the greater seat area contacted by the face of the valve the more heat will be con-

(Continued on page 42)



## Burn the Midnight Oil



*-to keep abreast the new developments in the repair field*

THE mechanics and shop owners who never get stumped, regardless of how difficult or unusual the problem may be, are the ones who have the most profits and the biggest profits.

But you can't stay on top of the pile without studying. Unfortunately there are too many mechanics who are content with the knowledge they obtained of service work ten or fifteen years ago. They were undoubtedly good at that time but, not having studied new methods, are hopelessly behind the times.

The industry moves too fast to

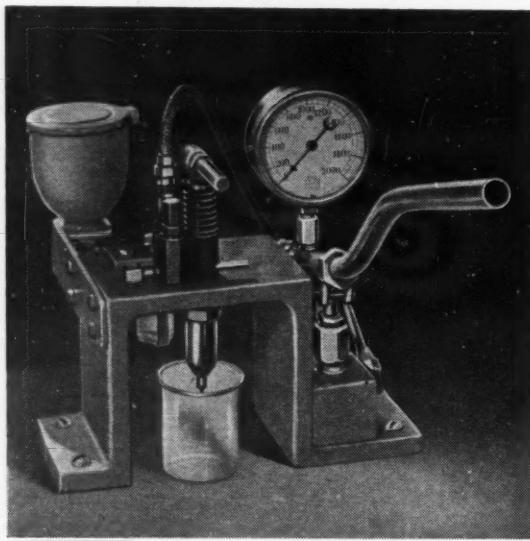
permit anyone to sit back and take a rest. Not only does the design of the different cars and trucks change from year to year, but tools, equipment and methods of testing and analyzing also change. What may be considered as good mechanical practice today will be obsolete tomorrow.

Fortunately there is a wealth of material available that enables the ambitious mechanic, who is willing to burn a little midnight oil, to keep abreast of the times. Reading trade papers such as MOTOR AGE will make a good mechanic bet-

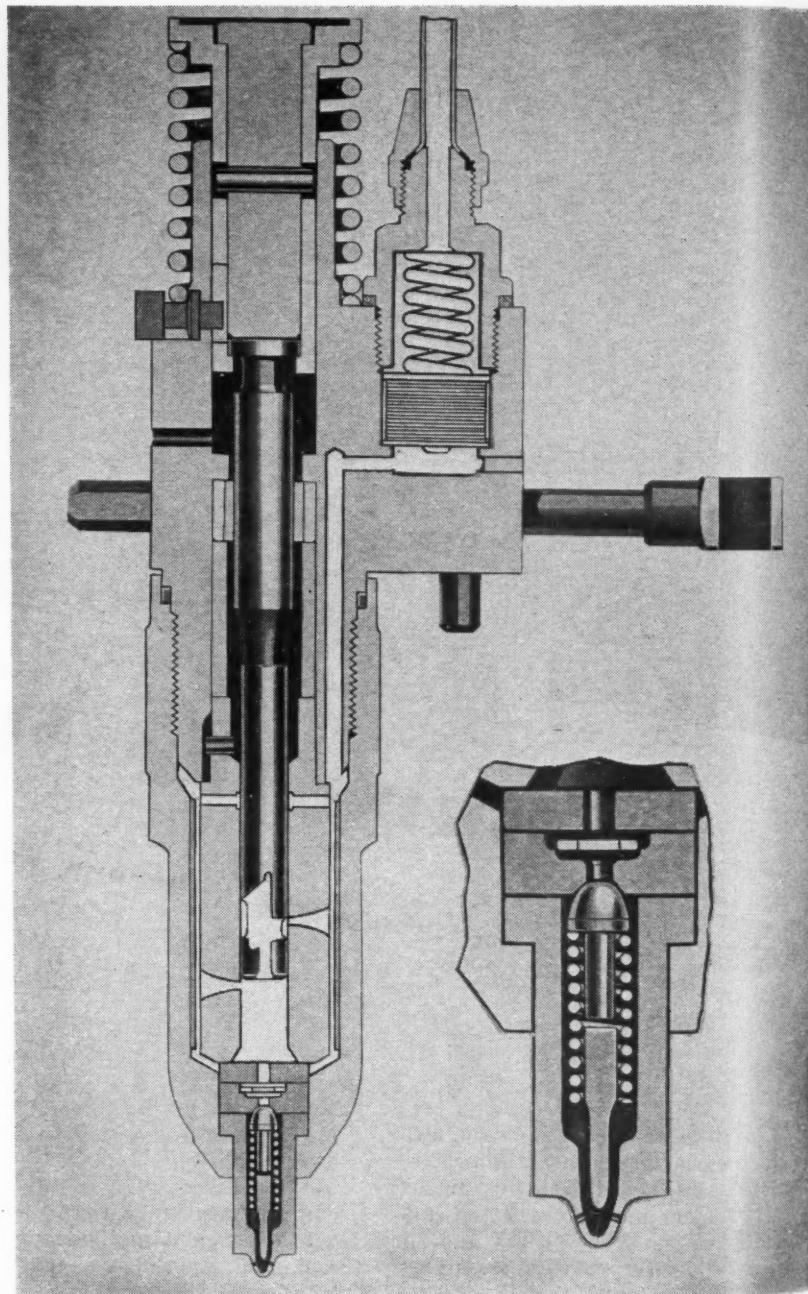
ter. Of equal importance are the special manuals and instruction books provided by the various manufacturers of parts and equipment. Such manuals take up in detail the causes of and the ways and means of overcoming various types of automotive troubles. Oil pumping, bearing failures, wheel alignment, overheating, ignition and electrical troubles, to mention a few, are among the subjects on which complete information is available by writing to various manufacturers.

For example, take the certified  
(Continued on page 46)

# Maintenance of the 2 cycle



Above: Test fixture for checking injectors. Right: Cross section of the injector showing how the amount of fuel injected is metered by the travel of the plunger when the helix has stopped registering with the upper port and before it registers with the lower port. Far Right: Parts of the injector below the injector body in order of assembly.



THERE is no reason in the world why a fleet operator cannot service GM Diesel fuel injectors if he makes up his mind that the job is just a little different from anything he has ever done. At little training and very little equipment will be sufficient to start a mechanic in this specialty. He will improve, as in all other phases of mechanical work, with experience. Because of the accuracy and manual dexterity required in electrical or carburetion work, it looks like a job for the shop electrician or carburetor specialist.

One of the prime requisites for successful servicing of these injectors is a new conception of cleanliness. A bright metal surface on the work bench is desirable because it is easier to keep clean, but it is not absolutely necessary because every part as it is laid down must be placed on a clean sheet of paper. An adjustable work-light over the bench is necessary. As a matter of convenience, a magnifying glass should be fastened to it at such an angle that work in the

hands can be seen through it when the occasion arises. If the work bench can be located in a room or coop apart from the shop so much the better. A wired off or boarded off corner of the tool room would be ideal.

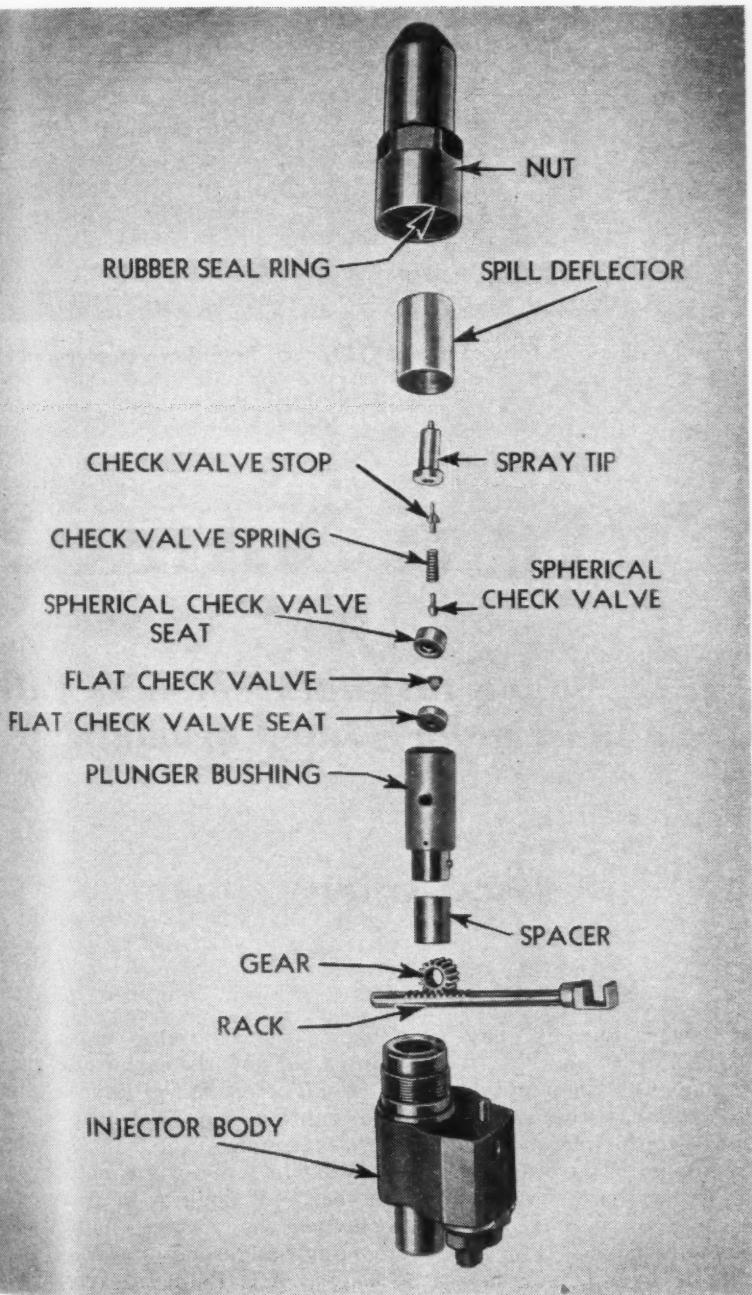
The equipment required is a kit of injector tools, all of which, even though special, are low-priced hand tools; an injector vise, which is a fixture for a regular bench vise that holds the injector without damage to it, and testing equip-

# GM Diesel Injector

By **HENRY JENNINGS**

TECHNICAL EDITOR, COMMERCIAL CAR JOURNAL

Servicing the GM 2-cycle Diesel Injector is the second article developed by the author who spent two weeks studying and working on these new engines along with 13 Greyhound men. The purpose of this effort is to point out in a practical way the details that will seem new and strange to experienced gas engine mechanics so that they may approach diesel engine maintenance with confidence. This article is not intended to replace shop manuals furnished by the manufacturers.



ment which consists of a source of fuel, a fixture for holding the injector, a lever hook-up to depress the injector plunger and a pressure gage. An air hose supplying filtered air and two enamel pans complete the equipment.

Before dis-assembling the injector should be checked on the testing equipment. Make the checks in the following order: First—examine spray pattern to make sure that all orifices in spray tip are open. Make sure that a receptacle is placed

under the injector so that it will catch the spray. Do not let spray touch fingers as this spray is under high pressure and oil may penetrate fingers and may cause infection.

Second: Check pressure at which spray occurs. This should be between 1000 and 1800 lb. and should not vary more than 200 lb. among injectors of the same engine. There should be no dribbling or wetness at the tip after injection.

Third: Subject the injector to 500 lb. pressure for at least 30 seconds without dribbling and without wetness at the spray tip. Make sure that there is no leakage at seat nut threads.

Fourth: Take injector in hand and hold it horizontally with rack extended up. Rack should fall of its own weight. Turn injector over and check to see if the rack will fall the other way.

If the injector passes these tests it is satisfactory for service. If it is to be stored in the stock room it should be filled with a non-corrosive fuel oil.

(Continued on page 54)



Attractive front of the Psenner-Pauff shop in Glendale, California. Note thermometer and clock

# What's in a Name?

**Automotive services are intangibles, says this modern shop, and must be presented dramatically**

**G**IVE it an "angle" if you want it to sell. That is the prescription which has built Psenner-Pauff into the fastest-growing automotive repairers and specialists in Glendale, Calif. Automotive services are intangibles, maintains Art Pauff. Therefore they must be presented dramatically—like insurance.

The angle is to give motorists not a "Repair Job," a "Tune Up" and so on, but something they can obtain no other place but in your establishment. That is what brings them back for more, building the customer list. Tune ups, for example, are not called by that name in this shop. Instead, the public has been sold on "Psennerizing." Eleven talking points were built around the "Psennerize" job, which is a copyrighted name for the service. Psennerize was then featured in advertising and talked about at point

**by J. J. STAPP**

of sale, the phrase "tune up" having been barred.

Not only does the shop obtain more work on this basis but is also able to obtain approximately two dollars more than for an ordinary tune-up job. Every phase of repairing and service is merchandised under the same principle. For example, a radiator-cleaning ad reads: "Only here can you secure the Famous Psenner-Pauff Specialized Radiator Service." "See Safely—Go Safely" is the angle used to sell auto lighting service.

In addition to regulation advertising copy, the firm uses "news stories" to bring in motorists. For example, a recent story was on the

subject of carburetor care, and pointed out how the carburetor may be friend or enemy. Pictures with brief captions pointing out various services are also used. Interesting spots to which motorists may travel are featured along with warnings about various factors that make traveling dangerous or safe.

These, Art Pauff asserts, pull better than regulation-type advertisements. In short, every garage and automotive service establishment is selling a job. To make the business outstanding it is necessary to sell the job—something unique, something that cannot be purchased in every establishment. With all

*(Continued on page 32)*

# Tuning in Radio Profits

NOT one of those step-child radio departments (the kind about which it is said—"Oh, yes, we do some radio work") but a radio department aggressively merchandised to a profitable volume is the one which rounds out complete automotive maintenance facilities at Central Tire and Service Co., Seattle, Wash.

Here are the five guideposts to a successful radio department, as pointed out by F. B. Taylor, manager of this outstanding service garage:

1. The department must be in charge of specialists, not "handy men," functioning regularly in other service departments. The man in charge of Central's radio unit is a graduate radio engineer, who does no other work save on radios. Mr. Taylor says: "There is no other department where expert repair work does such a good job of bringing them back. A man can get a good tire repair job and not think it momentous one way or another, but he'll never forget the shop that did a good job on his radio. He not only comes back, but he tells his friends. Radio, as a feeder for other departments, is of inestimable value."

2. It has to be pushed, not left to shift for itself. Central's servicemen are particularly trained to sell radio repair by suggestion, and the radio men also go over cars left in the shop. If the radio needs repair, that fact is noted on the wheel reminder form, the same as in the case of any other needed service work. The radio department is also publicized in a large banner on the main service floor, by another banner at the point of drive-in.

3. Direct mail is found to be a fine radio build-up. The Central garage has produced a most attractive folder which is mailed to customers in other service departments; also, it is distributed to tenants in nearby office buildings. (Central Tire has a strategic center-of-town location.) The latter method has been found to be very effective in stimulating new business.

4. Both home and automobile sets are included in the repair  
*(Continued on page 44)*

**A maintenance department for car sets is full of profit possibilities in addition to being a "feeder" for the rest of the shop**

**By MANDUS BRIDSTON**

Seattle's Central Tire and Service Co. has an attractive and busy downtown location.





# LEGALLY SPEAKING

by C. R. ROSENBERG, JR.

**A lawyers' interpretation of Federal and local court decisions of interest to repairmen, presented each month by Motor Age. A knowledge of how the law regards these various situations may help you keep your shop from being on the wrong end of a lawsuit some day**

## Time Limits On Offers

HOW long does the law allow a repairman to accept or reject an offer made to him? Answering this question in a recent case the Federal Court explained:

"When an offer is made for a time limited in the offer itself, no acceptance afterwards will make it binding; any offer without consideration may be withdrawn at any time before acceptance; and an offer which in its terms limits the time of acceptance is withdrawn by the expiration of the time.

"Where an individual makes an offer by mail, stipulating for, or by the nature of the business having the right to expect an answer by return mail, the offer can only endure for a limited time and the making of the offer is accompanied by an implied requirement that the answer shall be sent by return mail. If that is not done the person making the offer is released from it."

It is ordinarily said by the Courts that an offer which specifies no particular time for acceptance is intended to be valid for a reasonable time, but the reasonable time depends upon the circumstances of the particular situation. The best practice for a repairman who wants to avail himself of an offer, is to accept it promptly.

## Employment Contract

A REPAIRMAN entering into a formal contract of employment with an employee should be extremely careful in specifying the conditions under which the employee may be dismissed.

A Louisiana employer hired a man by written contract providing for the payment of a salary of \$150 per month. The contract also provided that the employment might be terminated "at the expiration of thirty days after written notice has been given by either party."

The employee worked under this contract for several months. The employer then mailed him a letter dated July 28, advising him that his contract would be cancelled as of the

date of the letter. The employee actually received the letter on August 2.

Thereafter, the employee sued the employer for two months salary. He based his claim on the contention that thirty days written notice of intention to cancel was required and that, since he did not receive notice until August 2, it could not be effective until thirty days later, which would be after the commencement of the month of September.

The court, taking the view that the employment was based on the calendar month, agreed with the employee and said:

"Since it appears that the contract could only be terminated thirty days after written notice and since the written notice was not delivered until August 2, and since the term of employment for the month of September had already commenced at that time, it was evident that that notice could not take effect until the end of September."

Which suggests that, unless he is careful, an employer may find it much more difficult to discharge an employee than to hire him.

## Interference with Another's Deal

HONEST competition to get an order or close a contract violates no law, but once a deal has been closed or a contract entered into by a competitor, any attempt by an outsider to interfere with the transaction may backfire in a serious damage suit.

In a recent case of the kind a group of men in the same line of business combined to interfere with a competitor's performance of his contract. They did this by preventing the competitor from getting the skilled union labor essential to the completion of the contract. The competitor sued this group for conspiracy to interfere with his performance of his contract and obtain a verdict against them for damages.

This particular case was brought under the statute of Tennessee which reads as follows:

"It shall be unlawful for any person, by inducement, persuasion, misrepresentation or other means to induce or procure the breach or viola-

tion, refusal or failure to perform any lawful contract by any party thereto; and in every case where a breach or violation of such contract is so procured, the person so procuring or inducing the same shall be liable in treble the amount of damages resulting from or incident to the breach of the said contract; and the party injured by such breach may bring his suit for said breach and for such damages."

Even in states without such a statute, interference with contract is a legally recognized form of damage.

## Must Pay In Full

THAT an ordinary sale of goods may become involved in complex legal situations was shown in a recent Pennsylvania case.

There the purchaser tendered a check marked "in full settlement for account to date." This check was actually \$116 less than the amount of the invoice. The deduction was alleged to be for certain goods which the purchaser claimed to have returned for credit. The seller declined to allow such credit.

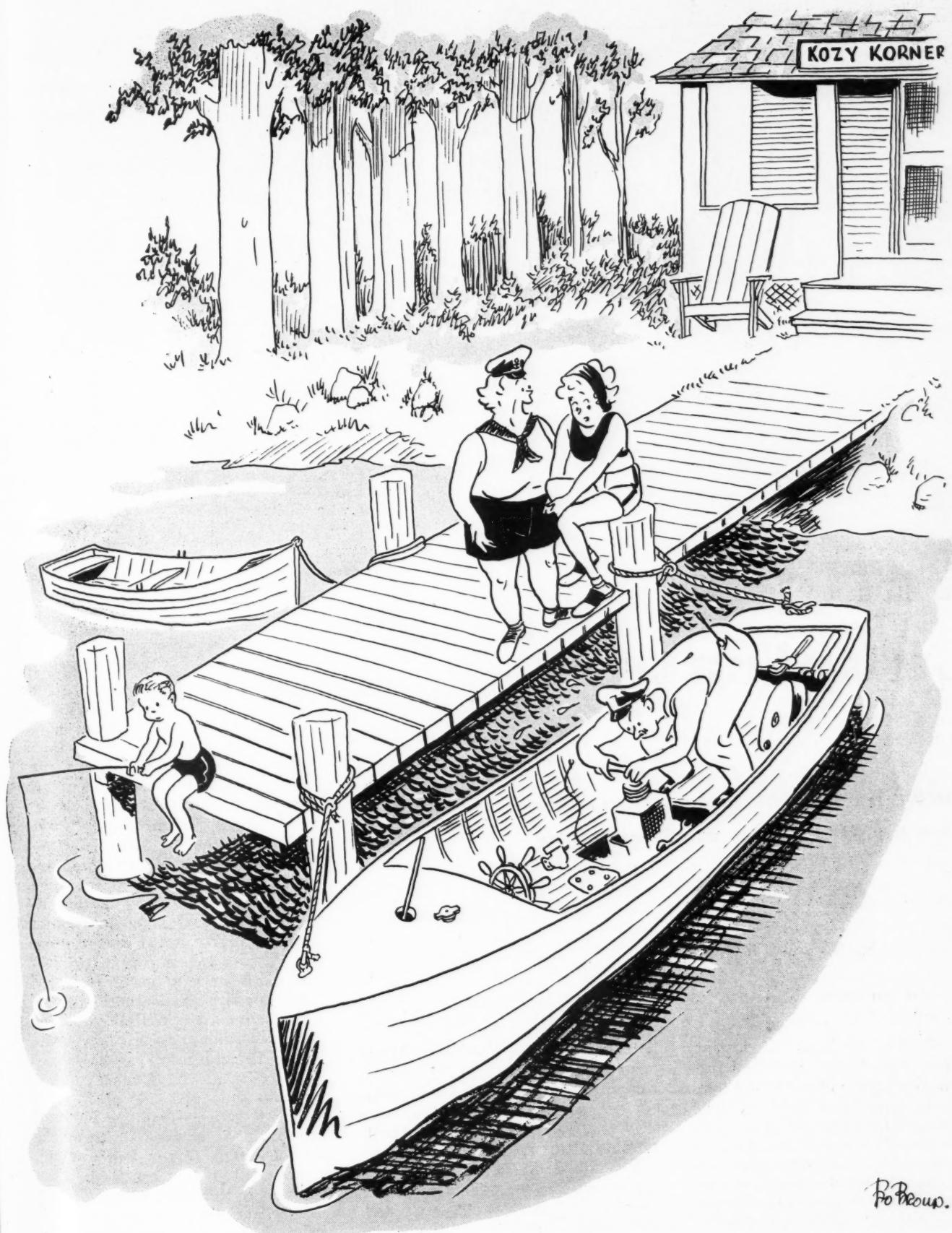
Despite the notation on the check, the seller accepted it as payment on account and so notified the buyer. Thereafter, the seller sued the buyer for the unpaid amount of \$116.

The buyer's defense was that the acceptance of the check marked as it was constituted a legally binding "accord and satisfaction" in settlement of a dispute between the parties. This dispute, of course, was over the credit claimed for the returned merchandise.

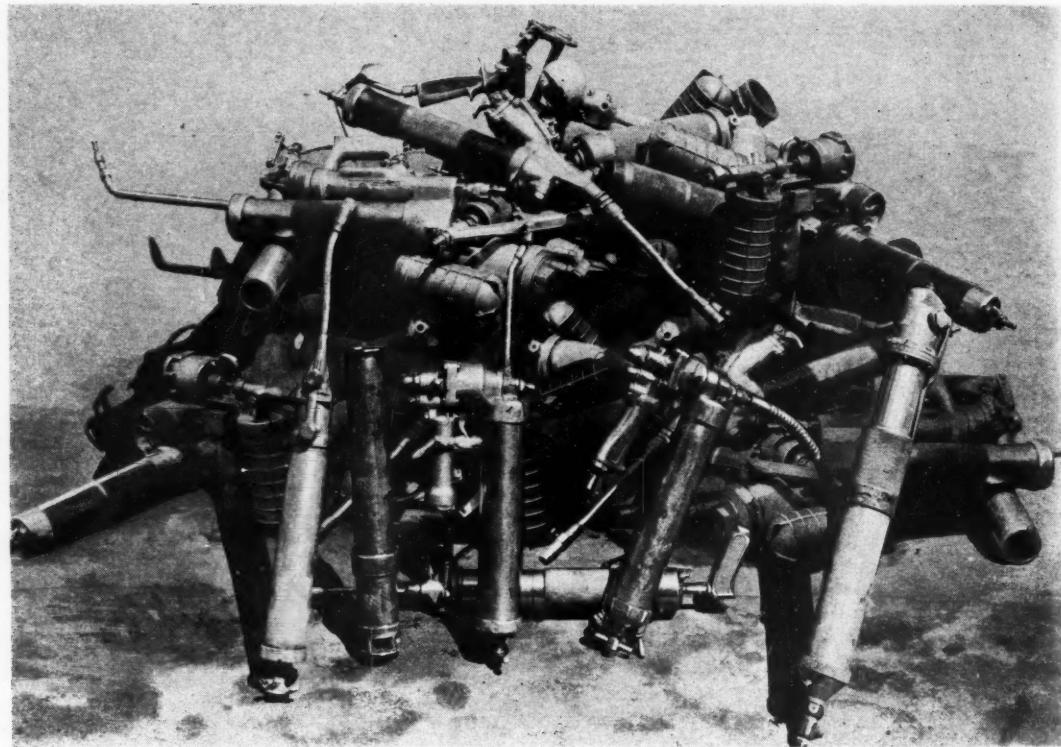
"Unless there exists a genuine controversy concerning the amount due," said the Court, "mere payment by one party of a sum less than the whole of the claim and its acceptance by the other do not erect a foundation for such a settlement as may be deemed an accord and satisfaction."

The goods returned for credit in this particular case had been held for two months by the buyer, and they were seasonal goods. The return of this merchandise after such a delay for alleged defects was not sustained by the Court and the attempt to claim credit for the goods was considered not to be an honest controversy about

(Continued on page 57)



*"This is the first vacation Ed's been able to get away from the shop in four years!"*



# Antique Lubricators

**— may be OK for a museum, but  
have no place in a modern shop**

**by T. N. THOMPSON**

**I**F all the old junk lubricating guns now dangling around service stations were planted on a bonfire and cremated, service stations and motorists would be better off, and automobiles would be safer to ride and drive. As a matter of fact that goes for all obsolete lubricating equipment. And this is not propaganda for manufacturers of lubricating equipment, it's a plain economic fact that costs you, Mr. Service Station Manager, many dollars in more ways than one.

Antiquated equipment at its best

is inefficient, slow, and far more expensive in the long run. It can be compared to an out-and-out loafer—when you do put them to work they waste a lot of time getting into action and then "half do" the job.

You have to keep giving old equipment a shot in the arm in the form of repairs, parts, etc., and that costs money, away too much for what you can possibly get in return. That's foolish economy, a shining example of where it is costing money to save money, penny wise and pound foolish. Now add

to the repair costs, the loss of time plus the loss of some lubricating business and if the king and all his horses can show you where that's going to net you any profit anywhere along the line, then this country ought to become loaded with kings. Regardless of who, where or what type of lubricant you handle there is no such an animal as an exception to this rule. Old equipment always has and always will drag your lubrication business down in the gutter. You can't begin to compete with your competitor when he is equipped with modern guns and modern equipment and you're parading around with an old rusty musket which fires once in a while and backfires most of the time.

That's only one side of it—let's look at it strictly from the angle of new business, or even clinching the old business. If you know of any service station that can hold its old business in this day and age of keen competition, let alone get new business without any special effort or decent equipment, it will make a great bit of news for the industry.

It's a well known fact that hundreds, yes thousands of service

*(Continued on page 32)*



## THE SHOP OF THE MONTH

This month our spotlight shines on Auto Brake Service Co., Inc., an independent shop located in Portsmouth, Ohio, and a Motor Age subscriber. President "Bill" Hedges tells us he employs four men and his business volume for the year amounts to \$15,000. Material purchases for a year amount to about \$4,500. Ravages of the '37 flood made it necessary to replace or rebuild most of the shop equipment and the equipment and tools now on the books are carried at more than \$8,000.



## THE READERS' CLEARING HOUSE

# Service Men's Queries

### NO MONKEYS HERE

We are having trouble keeping the squeaks out of the wishbone type of independent front wheel suspension—particularly 1937 Buicks and 1937 Oldsmobiles. We have tried various types of lubricants in these fittings and have no difficulty in stopping the squeaks, but keeping them stopped between normal lubrication periods is our problem.

None of us mind being a grease monkey, but we would appreciate your help in eliminating us from the out-and-out monkey class. F. S. Evans, Hadley-Evans & Cook, 23rd and Colby, Everett, Wash.

I THINK I have a prescription that you can apply and which will eliminate all trace of the Darwin theory. It consists of a little gadget that you can buy from your Oldsmobile dealer under Part No. 410756 at a cost of

two bucks (\$2). This part number covers all the parts necessary to convert one car, and consists of four Part No. 173648 hydraulic grease cups and four No. 410757 adaptors.

You might try getting a set of these parts and putting them on one car to see how they work out. I understand, from the boys around here, that they do a very nice job of eliminating this annoying squeak.

### WHY CLOSE THE SQUIRT HOLES?

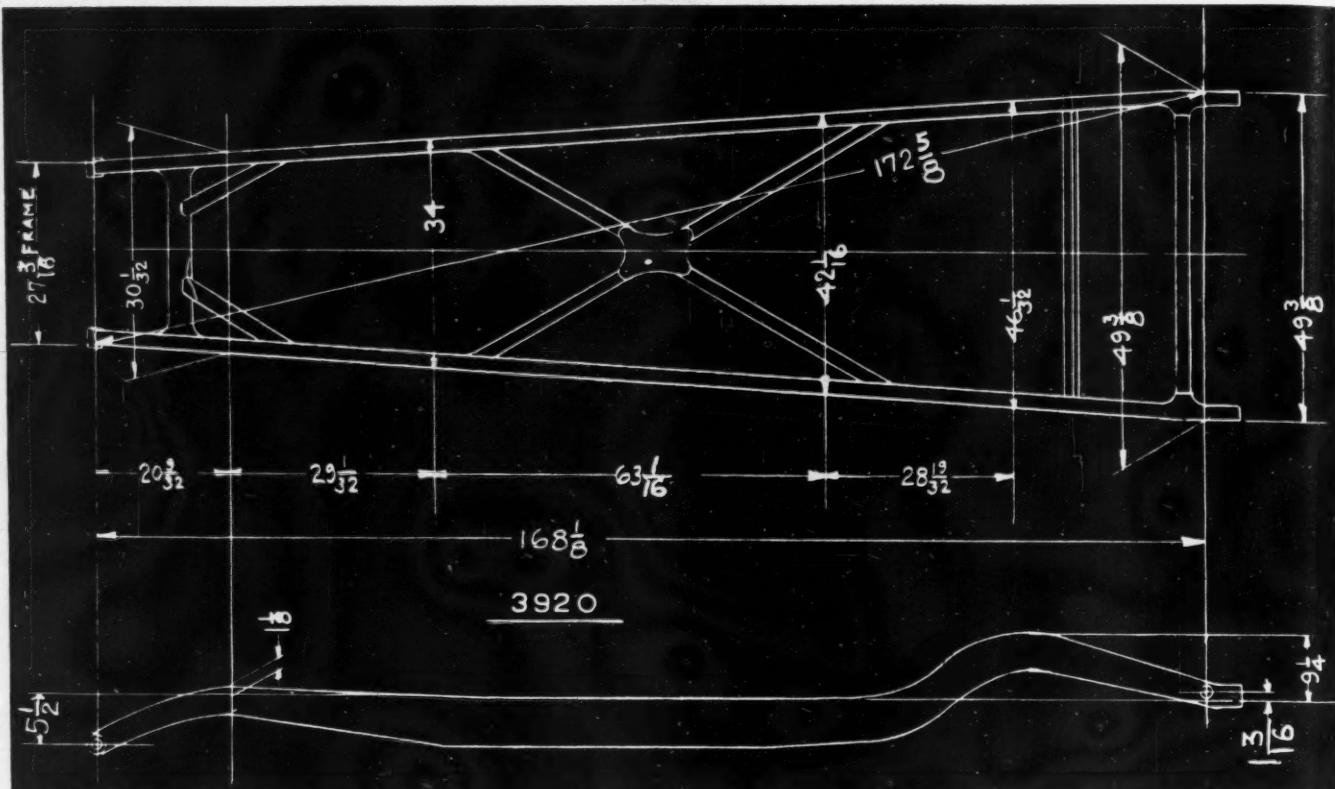
I am writing you for an answer in regard to a Buick Standard 1929 and also a Chrysler 70, 1924. I put rings in both of them and found the oil holes in top of rod plugged in both cars. Some mechanic had taken a center punch and plugged them up. What I want to know is why it was done.

The people that made the car made that hole to spray and oil the wrist pin. I say it is for that purpose and should be there. The crankshaft is drilled so when the two holes come up it shoots a stream of oil up to wrist pin. Can you explain this? J. W. Deyarmin, Tres Pinos Garage, Tres Pinos, Calif.

YOU are absolutely right when you say that the oil holes or squirt holes in the rods are placed there for the purpose of lubricating the cylinder walls and wrist pins. However, as the engine becomes worn, the clearance of the bearing increases and, consequently, a lot of excess oil is thrown off from the rod bearings, which also tends to lubricate the cylinder walls.

For that reason, on an old engine many mechanics close up the squirt holes on the assumption that the cyl-

(Continued on next page)



1939 Nash 3920 Frame Diagram

(Continued from preceding page)  
inner walls are receiving sufficient lubrication from the throw-off from the worn bearings. Naturally, if the crankshaft is reground and new bearings installed, those squirt holes should be opened up once more. But, in those cases where the crankshaft is not reground, you will obtain better oil mileage with the squirt holes closed.

### OIL LEAK

I am having trouble with a rear main bearing oil leak on a 1929 Chevrolet Six.

This car was brought into my shop a few days ago, the owner complaining of excessive oil consumption and that oil dripped off the pan every time he

stopped. We removed the oil pan and the rear main bearing cap. Bearing and cap were OK. Oil drain passage in the cap is open after taking up all bearings and replacing pan using new gaskets. The car still leaks oil from rear main bearing after the engine has run a few minutes. Any help you can give me on this will certainly be appreciated.

I would also like information on overhauling the free-wheeling units on 1932-33 Chevrolets and on the knee-action units on 1934-38 Chevrolets. Alton O. Larson, Park River, N. D.

ON your 1929 Chevrolet which is leaking oil out of the rear main bearing, I suggest that you install a new center main bearing cap in order to reduce the end-play of the crank-

shaft and, in addition, drill out the oil drain passages in the rear main bearing cap about 1/16 inch larger in diameter and also leave out the ball check in the drain hole. This should overcome your trouble unless the crankshaft journals are excessively out-of-round.

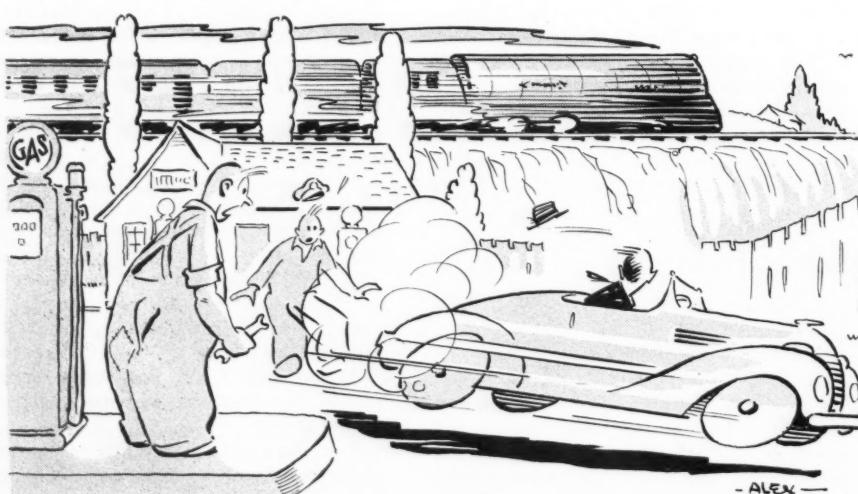
Information on servicing the knee-action units and free wheeling units is being mailed you. The instructions covering the Chevrolet knee-action unit are taken from our Chilton Flat Rate & Tune-up Manual and we are sending you information on the free wheel unit.

In connection with your free wheel unit, it is my belief that you will probably have to replace the drive sleeve, driven sleeve and spring.

### CAR PULLS RIGHT

I have been a constant reader of MOTOR AGE and also am using the Chilton Flat Rate Manual which has been a great help to me, as well as very profitable, and wish to thank you. I have never had any occasion to write to your Clearing House for advice but I am in a spot now—for the first time—and hope that you can help me.

The car I am having trouble with is a 1937 Oldsmobile six cylinder, four door sedan, which pulls to the right at all times on any kind of road or highway. I have measured both tie rods which are of equal lengths, wheel alignment perfect, caster and camber perfect, checked and filled shocks which are OK, checked king pins and bushings, and all support arms, and



"I dunno—I just told him to race the engine!"

bushings which are all tight. I tightened all body bolts and rear spring shackles and U-bolts. All wheels are free and no brakes dragging and I adjusted steering. Checked wheel base on both sides, O.K., and car tracks perfect and still she pulls to the right. Customer is original owner, car has never been in any kind of accident and mileage is 16,538 and has been pulling to right slightly from new but is getting worse lately. Have I slipped up on anything? What is your idea? Would appreciate an answer. Leo A. Neugebauer, 1321 Woodland Ave., N. S. Pittsburgh, Pa.

MY guess as to the cause of the trouble you are experiencing on a 1937 Olds Six is that one of the front springs has gotten weak. I would suggest that you check the length of these front springs and make sure that they are approximately even.

Perhaps it might pay to try interchanging the two front springs to see if it overcomes your trouble. Without any load in the car, the distance from the frame to the ground at the front of the chassis should be the same on the same on both sides within  $\frac{1}{8}$  inch—although  $1/16$  of an inch is preferable.

It is also possible that some of the threaded bushings have become worn, resulting in excessive play which might cause your trouble.

I note that you have checked the shock absorbers but unless you are absolutely sure that these are in perfect condition, I would advise rechecking them or having the units rebuilt. You might also check over the adjustments of the front wheel bearings to make sure that these are equal on both sides.

## FIX THE MAIN BEARING

Some time back your expert information saved me an impossible operation demanded by a customer and helped sell a rebore job which was exactly what he needed.

Now I have a 1935 Pontiac Six with a rear main bearing which persists in leaking. To start from scratch, this motor has just had a complete set of rod and main bearing inserts installed in another shop. The job was given a few miles to limber up and seemed to be O.K. until it was driven fast—then it used six quarts of oil in 30 miles and burned out No. 6 connecting rod.

The job was then turned over to us. We renewed the inserts in No. 6 and found that at high speed the oil poured out the back main.

Upon inspection we found that the back main cap had been filed and was that way before the other shop installed inserts. As the customer did not want the expense of a new cap and the old cap being very crooked, the cap was filed true and lapped on a surface plate. Then shimmed out to fit inserts.



## TROUBLE?

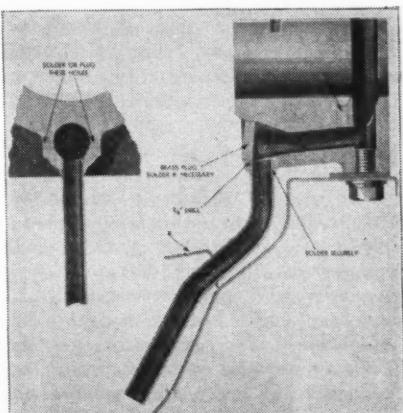
If you are stuck with a puzzling repair job that just won't turn out right, write to **BILL TOROLDT, Editor of MOTOR AGE**. Each month we present here a few of the numerous queries received. We'll try to straighten out your problems for you. Don't cuss—write us!

At the same time we removed the ball check from back main, drilled the oil return hole larger and installed a return tube which reaches the bottom of the pan. This seemed to be O.K. until the motor became very warm at high speed, then it would start leaking but seems to have improved it some.

With the flywheel housing pan removed, one can see that there is absolutely no oil coming from the rear of the camshaft. The oil seems to come out around the crankshaft. The oil pressure will stand at about 30 lb. from 30 m.p.h. up.

The original rod inserts had an oil groove and the new ones do not have any grooves. The rods being rifle drilled, what will be the results?

Do you think that the installation of new main inserts and caps would stop the leak? There is no excess



endplay in the shaft, nor is the shaft excessively flat.

I have an oil pressure tank but would like specific instructions for making oil pressure tests.

Also is there anything further necessary in installing these mains than obtaining the correct size inserts for the shaft? Harry Leu, Harry Leu Garage, Louisville, Neb.

APPARENTLY you have followed the instructions outlined in the Pontiac Shop Manual pretty completely with the exception of drilling a  $\frac{1}{4}$ -in. hole at an angle of 45 deg. through the rear main bearing cap. I am sending you sketches taken from the Pontiac Shop Manual which, I believe, will assist you in taking the final step.

Check the diameter of the rear crankshaft main journal and if this is in excess of 0.002 out of round, we would recommend that a new shaft be installed. Also, check the chamfers at the parting line of the rear main bearing shells and make sure that the chamfer is extended toward the crankcase end and closed up at the flywheel end. This will help to reduce excessive oil pressure at this particular point.

Under separate cover, I am sending you a copy of an article which appeared some time ago in MOTOR AGE which gives details on an oil pressure test.

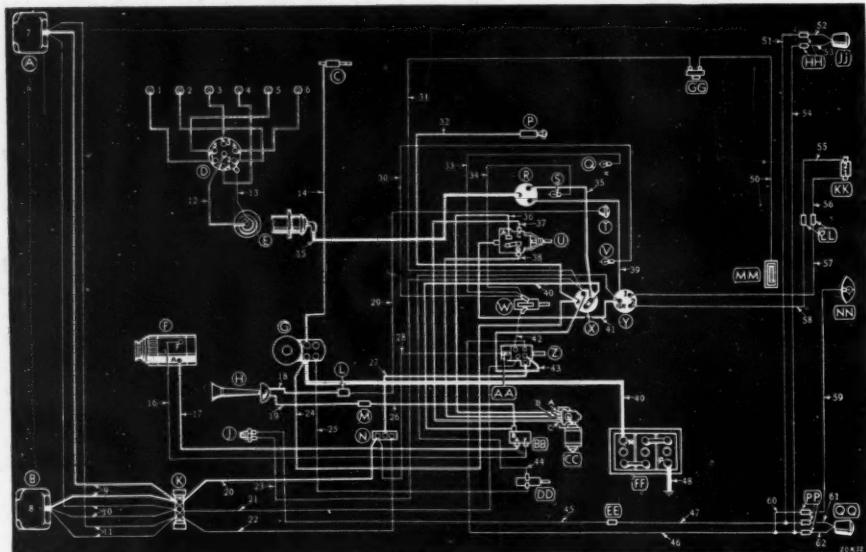
## TRUCK TROUBLE

I have been a reader of MOTOR AGE for four years and like it better than any magazine I have read. I am having some trouble of my own now and want some advice on it.

I overhauled a Diamond T Truck 34 with a JXA motor a year ago. This truck was driven into a creek and stuck and got loaded up with sand—then, it was driven about two weeks and the motor was wrecked. I had the crankshaft turned down and all the bearings re-run and put in cam-shaft bearings and rebored the block. This truck ran about 1,000 miles then started throwing rods. I took the motor out again and made the bearing shop run them all over again. I also put in new oil pump, gears and by-pass spring. The only thing I didn't put in this engine was a new oil pump body. The second time this engine was put together the oil pressure would go to 80 lb. when cold but would drop to 10 when hot. The other day another rod went out. The main that fed this rod was in good shape and the feed line was open.

Could you tell me why the oil pressure varies this much? I think this is where the trouble is. Does this engine feed the camshaft bearing off the main? I don't remember and if they do, can I buy valves for them like they make for Chrysler-made automobiles?

Please give me some advice on this  
(Continued on next page)



Chrysler 1939-C-22 Wiring Diagram

**A**—Headlamp—right  
**B**—Headlamp—left  
**C**—Automatic choke  
**D**—Distributor  
**E**—Coil  
**F**—Generator  
**G**—Starter motor and solenoid  
**H**—Horn (single)  
**J**—Signal lamp switch  
**K**—Terminal block  
**L**—Cable connector  
**M**—Cable connector and fuse  
**N**—Headlamp dimmer foot switch  
**P**—Cigar lighter  
**Q**—Instrument lamp—right  
**R**—Ignition switch and lock  
**S**—Ignition switch lamp  
**T**—Horn button  
**U**—Windshield wiper switch (2nd type)  
**V**—Instrument lamp—left  
**W**—Instrument lamp switch  
**X**—Ammeter and circuit breaker

**Y**—Fuel gage (panel unit)  
**Z**—Head and tail lamp lighting switch  
**AA**—Headlamp bright beam indicator lamp  
**BB**—Voltage and current regulator  
**CC**—Windshield wiper motor  
**DD**—Starter switch  
**EE**—Cable connector  
**FF**—Battery  
**GG**—Reading lamp pillar switch  
**HH**—Cable connectors  
**JJ**—Tail and signal lamp—right  
**KK**—Fuel gage (tank unit)  
**LL**—Cable connectors  
**MM**—Reading lamp  
**NN**—Rear license plate lamp  
**PP**—Cable connectors  
**QQ**—Tail and signal lamp—left  
**1-6**—Spark plug cables (high tension cable)

**7**—Headlamp internal cables and sockets assembly—right  
**8**—Headlamp internal cables and sockets assembly—left  
**9**—Red—lower filament cable  
**10**—Yellow—auxiliary bulb cable  
**11**—Black—upper filament cable  
**12**—Coil secondary cable (high tension cable)  
**13**—Black—coil primary cable  
**15**—Ignition lock switch and cable assembly  
**48**—Battery ground cable and terminal assembly (+) positive  
**49**—Starter cable and terminal assembly (−) negative  
**52**—Red—signal lamp cable  
**53**—White—tail lamp cable  
**61**—Red—signal lamp cable  
**62**—White—tail lamp cable

(Continued from preceding page)  
 truck as I have done everything that I know. This truck is never driven over 40 miles per hour. Mike Llewellyn, Mike's Garage, DeBeque, Colorado.

Of course, it is rather hard to say at this distance just what caused the trouble with your Diamond T truck. However, there is a strong possibility that you didn't clean out all the sand when you overhauled it the first time. I think to be absolutely safe on this job, it might be advisable to take the engine out of the chassis, disassemble it and then wash the block with a strong stream of water to be absolutely sure that you get all the sand out.

On the other hand, if you are absolutely sure that the block is clean, I suggest that you make an oil pressure test on this job to see where your oil is leaking. Details of this test are contained in the article I am sending you.

I would strongly advise taking the crankshaft out and thoroughly blowing out all the oil lines to make sure that they are 100 per cent clear. I think it would also be advisable to check the crankshaft to make sure that the journals are still round within .003 inch.

Also, when cleaning this job, make sure that the manifolds are clear and have not pocketed any sand.

I am quite sure that if you will follow these instructions that you will be able to overcome your trouble.

### HARD STARTER

I have a 1931 Series 50 Buick which is very slow starting, after car sets a day or two, due to not getting gas to carburetor. The gas seems to disappear from the carburetor and gas line from fuel pump, which is on opposite side from the carburetor. I have checked over the carburetor and lines for leaks but don't find seepage anywhere. Yet, after car sets a day,

carburetor float will be clear down and dry of gas. What I wish to know is, where does this gas get away? D. V. Fanders, Diller, Nebr.

ON the carburetor trouble you describe in connection with a 1931 Series 50 Buick, I believe your trouble is most likely caused by loose jets in the carburetor. I suggest that you remove the bottom plate from the carburetor which includes the jets, taking care not to get the jets mixed and also taking care to tighten them securely. While you have this bottom plate off, I suggest that you check the float height which should be 19/64 inch.

Of course, while you have the carburetor apart, take care to blow out all the jets and passages and when reassembling use new gaskets throughout.

When making the foregoing suggestions I have, of course, assumed that your hard starting trouble is due to your carburetor as you described. In addition, it might pay you to go over the ignition system to make sure that this is okay also.

### ROAD SHOCK

First, I have a—now don't laugh, I have had it two years now and it is a sweetheart and has only 27,000 miles on it—1931 16-cyl., Model 452, Cadillac. The tires are in fair condition. I can drive along at five to perhaps fifty miles per hour and everything is fine, but, if I happen to run over a match in the road I get a terrible shock in the steering wheel. I've had a man go all over the car and he says everything checks all right, but the trouble still persists. There is no play in the steering, the front end is tight, and I don't get what we call a shimmy—just a road shock. If I go over a car track on an angle I get this shock so badly that I have to put my brakes on quickly and that straightens it up again. When I go around a corner, all I have to do is to let go of the wheel and it comes right back. You see, this vibration just raises heck with my right arm and neck which were broken in an accident two years ago. What do you think is the trouble in this car? W. B. Bertholf, Bertholf's Garage, 739 Sylvania Ave. (Rear), Toledo, Ohio.

ASSUMING for a moment that the caster, camber and toe-in on your 452 Cadillac is OK, I would suggest that you carefully make sure that the wheels are statically and dynamically balanced—second, that your shock absorbers are 100 per cent OK—and third, that your steering gear unit is in good condition and properly adjusted. Also make sure that your spring shackles are in good condition.

From what you have told me in your letter I am most inclined to believe that the trouble will most likely be found in the condition of your

springs or shock absorbers. In connection with shock absorbers, the local Cadillac agency tells me that they have made several changes in the internal specifications of these shock absorbers and it might be a good plan for you to take them off and have them overhauled by the local United Motors Service so as to be sure that you get the latest type parts.

Inasmuch as you get this condition from five miles an hour on up, I am not so inclined to believe that your trouble is due to caster, camber and toe or wheel balance. However, I would pay particular attention to shock absorbers and springs as I said before, and also to the adjustment of the steering gear.

## RAISING OIL PRESSURE

*I have always figured I would have to write to you some day. I have been reading MOTOR AGE and using the Chilton Manual for four years and like it very much.*

I would like to have some information on a 1936 Chevrolet Master oiling system. At the time I put rings in this machine, the oil pressure was 6 to 7 lb. I checked lines, by-pass and gage. Pump was not worn badly. I adjusted main bearings, camshaft seems to be O.K. This job has about 900 miles on it since I put in rings. Oil pressure was not improved. Yesterday, I dropped the pan, installed a new pump but pressure is still 6 to 7 lb. warm.

*I would like some information on this distributor and how to raise the oil pressure. Virgil Ballhoefer, Verg's Garage, Laurel, Iowa.*

THE first thing I would do on your 1936 Chevrolet would be to check the oil jet, as it supplies oil for the timing gears. It sometimes happens that these jets get loose and drop out resulting in oil pressure drop.

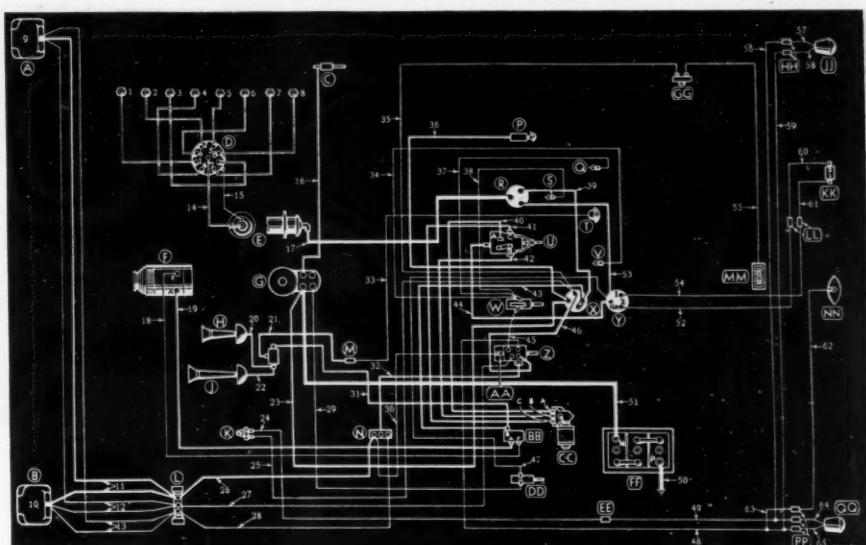
If this does not prove to be your trouble, I suggest a new relief valve and spring.

and spring. It is also possible that you are losing excessive oil at the main bearings and the only way to overcome this trouble would be main bearing replacement. However, I am inclined to believe that your trouble will be found in the oil jet in the timing case.

## LATE VALVE TIMING

We have a 1933 Big Six Nash 1120 Model — Motor No. E-30129 — Serial No. R. 278710.

Your books do not show the valve timing for this car, and we believe it is not correct. The intake valve does not start to open until the piston has traveled about 1/3 of the way down. The car has never had any pick-up or power—never has had since we have known the car. The owner has had it in different shops that specialize in Nash cars, but it always runs the same. It acts like it was starving for gas, but it has been all checked for the proper jets, new ones installed,



## Chrysler 1939—C-23 Wiring Diagram

A—Headlamp—right	Z—Head and tail lamp lighting switch	10—Headlamp internal cables and sockets assembly—left
B—Headlamp—left	AA—Headlamp bright beam indicator lamp	11—Red—lower filament cable
C—Automatic choke	BB—Voltage and current regulator	12—Yellow—auxiliary bulb cable
D—Distributor	CC—Windshield wiper motor	13—Black—upper filament cable
E—Coil	DD—Starter switch	14—Coil secondary cable (high tension cable)
F—Generator	EE—Cable connector	15—Back—coil primary cable
G—Starter motor and solenoid	FF—Battery	17—Ignition lock switch and cable assembly
H—Horn—right	GG—Reading lamp pillar switch	50—Battery ground cable and terminal assembly (—) positive
J—Horn—left	HH—Cable connectors	51—Starter cable and terminal assembly (—) negative
K—Signal lamp switch	JJ—Tail and signal lamp—right	57—Red—signal lamp cable
L—Terminal block	KK—Fuel gage (tank unit)	58—White—tail lamp cable
M—Cable connector	LL—Cable connectors	64—Red—signal lamp cable
N—Headlamp dimmer foot switch	MM—Reading lamp	65—White—tail lamp cable
P—Cigar lighter	NN—Rear license plate lamp	
Q—Instrument lamp—right	PP—Cable connectors	
R—Ignition switch and lock	QQ—Tail and signal lamp—left	
S—Ignition switch lamp	1-8—Spark plug cables (high tension cable)	
T—Horn button	9—Headlamp internal cables and sockets assembly—right	
U—Windshield wiper switch (2nd type)		
V—Instrument lamp—left		
W—Instrument lamp switch		
X—Ammeter and circuit breaker		
Y—Fuel gauge (panel unit)		
Z—		

*new fuel pump, rings, valves ground, points, condenser, coil installed—no good. Also, it runs very hot. The camshaft seems all wrong to us, as the valves do not open or close when they should. S. G. Reenion, Auditorium Garage, 5th Ave., North and Mercer, Seattle, Wash.*

THE valve timing for the 1933 Big Six Nash, as given in our Chilton Flat Rate & Tune-up Manual, is as follows:

"Valves are correctly timed when marks on cam and crankshaft sprockets are nearest each other and on line between shaft centers."

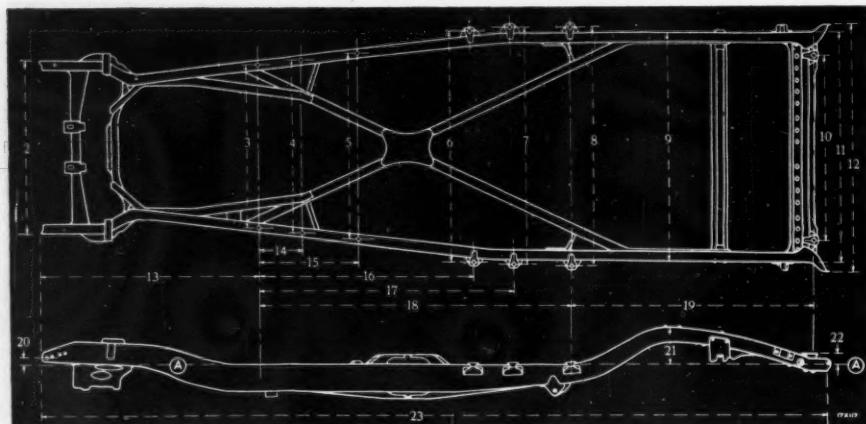
I am sorry that I don't have the information giving the valve timing in relation to piston travel, but Nash never released the information in that form. However, I agree with you that the valve timing seems to be incorrect and I would suggest that you check the markings on the timing sprockets, and if those marks are obliterated, I would reset the timing so as to have the intake valve open approximately

at 10 deg. after top center, which corresponds to most Nash valve timings.

## Poor Performance

I am writing in regard to an 8-cyl. Packard, Model 733. I have just recently rebored this car and it sounds fine until about 40 to 55 m.p.h. when a dull knock occurs. It seems to get louder and more pronounced as it is given the gas. As soon as you let up on the gas or at regular cruising speeds it is not noticeable. Also at 25 to 30 m.p.h. on a hard pull it is not noticeable. Is there anything you can suggest?

I get about nine miles to the gallon of gas. Would new jets or a new carburetor help? Pistons are T-slot aluminum, connecting rods seem to be in good shape; pistons were put in with slot to left of motor. The water does not boil but manifold heats vacuum tank and carburetor on hard pulls



1939 Chrysler Frame Alignment—C-22 and C-23

C-22  
Dimensions given in inches.  
A—Top line of frame  
2—36 5/8 (36 7/16 7-pass.)  
3—35 7/8 (35 31/32 7-pass.)  
4—40 1/2 (40 19/32 7-pass.)  
5—40  
6—51 3/32 (50 7/16 7-pass.)  
7—52 9/16  
8—52 9/16 (52% 7-pass.)  
9—48 1/4 (48 5/16 7-pass.)  
10—38 7/8  
11—48 1/4 (48 5/16 7-pass.)  
12—36 1/4 (36 9/32 7-pass.)  
13—19 5/32  
14—32 25/32

15—54 31/32 (63 13/64 7-pass.)  
16—64 19/32  
17—77 13/32 (94 13/32 7-pass.)  
18—49 25/32  
19—1 11/16 (12 1/32 7-pass.)  
20—8  
21—23/32 (21/16 7-pass.)  
22—169 1/32 (186 1/16 7-pass.)  
A—Top line of frame  
2—35 7/8  
3—37 3/32  
4—41 9/32  
5—40

6—51 1/8  
7—52 19/32  
8—52 19/32  
9—48 9/32  
10—38 7/8  
11—48 9/32  
12—43 19/32  
13—19 5/32  
14—32 25/32  
15—54 31/32  
16—64 19/32  
17—77 13/32  
18—49 25/32  
19—27/64  
20—8  
21—25/64  
22—176 3/8

(Continued from preceding page)  
until the gas boils and wants to lag on the hills until water is poured on vacuum to cool it off. "Innards" have been taken out of muffler. Any suggestions you can make will be appreciated. Chet Johnson, Stockton, California.

FROM the description you have given of the trouble you are experiencing on the 733 Packard, I am inclined to believe that your trouble is main bearings. I would suggest that you make an oil pressure test on this job to make sure of the condition of the bearings and to assist you in this, I am mailing you a copy of an article covering details on the oil pressure test.

I would also suggest disassembling the carburetor, resetting the float height and make sure that the economizer valve is OK. The installation of new jets would also assist in improving performance and gasoline mileage.

### WHY CLUTCH TROUBLE?

I would like to know why drivers in Indianapolis Race have so much clutch trouble. Frank Ambrose, 4903 N. E. Fremont St., Portland, Oregon.

FRANKLY, I don't know the answer—but, my guess is, that since they are using, for the most part, standard passenger car clutches which are designed for very much smaller amounts of horsepower the clutch can't stand up under the terrific speeds and overload.

Desirable clearance between bearings and journals is .0015 inch to .0025 inch. Bearings are generally considered serviceable with a maximum clearance of .004 inch, and should be replaced when clearance reaches .005 inch.

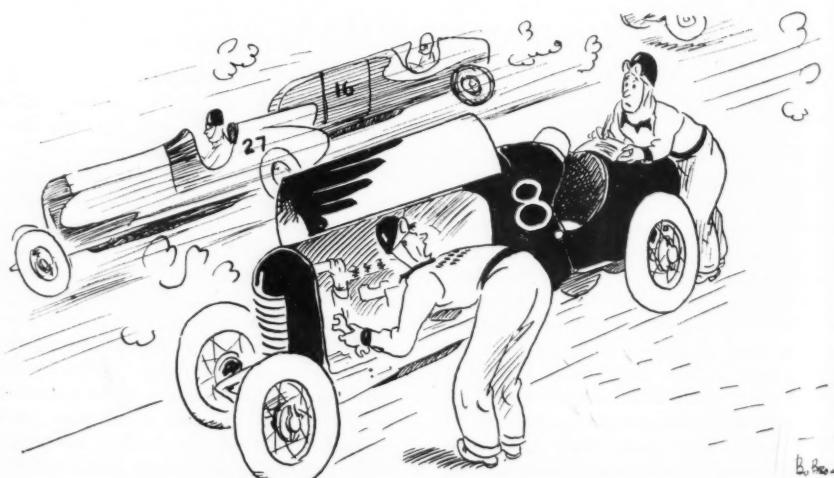
But, as I said before, these are only general instructions and individual design will affect them materially. In general, the larger the diameter of the bearing, the larger the clearance may be.

One of the difficulties in connection with bearing clearances is that while the clearance may be .004 inch at one part of the bearing, it might be very much in excess of that along the sides, which would result in excessive oil leakage. One of the best methods of checking bearings is, of course, by means of the oil-pressure test tank, and in case you are not familiar with this device, I am sending you an article which gives you the details on how to make one and how to use it.

### SHIMMY

May I ask you to list all of the things that cause shimmy. I have in mind a Plymouth 1936 coach on which we set the camber, caster and toe-in in accordance with Chilton specifications. At first we had real performance but about a month later the owner had someone grease the car and it started to shimmy, particularly on a rough road and at a speed of around 25 m.p.h. Any assistance you can offer will be appreciated. An Ohio Subscriber.

IN accordance with your request, I am sending you a copy of a story which lists the causes of "shimmy". In general, the most frequent cause is weak front springs, defective shock absorbers, and unbalanced wheels. From what you say about this car, I am inclined to believe that your trouble is either shock absorbers or springs, particularly since lubricating the springs seemed to aggravate the trouble.



"Why didn't you write to the Clearing House last week?"



While the silent operation of Dodge transmissions comes primarily from design, its full realization is assured by an after-treatment of the gears, called "lapping." This is a wet finish process giving the faces of the Amola steel gears the working smoothness that makes for perfect contact and quiet working. The picture above shows a Dodge worker giving the final "lap" to a set of transmission gears.

#### To Remove Overdrive Type Transmission

The following procedure on Studebaker Champion cars is recommended:

- 1—Loosen the top radiator hose.
- 2—Loosen exhaust pipe at the manifold and at the engine rear plates.
- 3—Loosen the clutch cross shaft at the engine.
- 4—Disconnect shifter rods at the transmission.
- 5—Disconnect the speedometer cable at the transmission.
- 6—Remove the propeller shaft.
- 7—Remove the universal joint flange from the transmission.
- 8—Place the jack under the engine at the rear plate and remove the rear support cross member.
- 9—Lower the engine at the rear sufficiently to permit removal of transmission (about 6 in.).
- 10—Care must be used to prevent damage to oil pressure gage pipe on the dash when the engine is lowered and raised.

#### Fluctuating Pointers

A fluctuating pointer on a fuel gage is caused by dirty contact points. This can be remedied by drawing a clean piece of writing paper between the points to clean them. (Chrysler Service Reporter)

#### Muffler Noise

Rattles or vibration noise in the Studebaker Champion car may be the result of insufficient clearance between the muffler tail pipe and other parts of the car. To provide more clearance, the muffler outlet pipe has

# Service Hints from The Factories

been changed and the front and rear brackets have been lengthened.

Where interference is encountered, additional clearance at the muffler outlet pipe can be obtained by installation of new front and rear muffler outlet pipe supports. To make the change, two new supports are needed.

1—Part No. 194672—Muffler outlet pipe rear support.

2—Part No. 194903—Muffler outlet pipe front support.

#### Camshaft Removal

When removing camshafts on Chryslers an easy method of holding the valves in wide open position is the insertion of a pinch-type clothespin under the head of the open valve. They can also be used to hold the valve lifters up while removing the camshaft.

#### Clutch Release Bearings

The clutch release bearing used on Models A-1A-2A-3A-4A-5A-6A-7A-8A Dictators, 9A Commanders, L5 Light Commercial Car and 5C President Studebaker models is now furnished only as an assembly which consists of the release bearing installed in the bearing collar. The bearing will not be furnished as an individual part as in the past.

The part number of the new clutch release collar and bearing assembly for all of the above models except the 1939 model 5C President is 196944. The part number of the clutch release collar and bearing assembly for the 1939 model 5C President is 195402.

#### Headlamp Relay Equipment

To reduce headlamp flare on the 1937, 1938 and 1939 Commander and President model Studebakers, a special relay for the lighting circuit is now available. A kit containing a relay and sufficient wires to make it adaptable to these models may be obtained through the Parts and Accessories Division or any of its parts depots under part No. 197151. The kit carries a list price of \$2.50 and the net price is \$1.50 plus tax and transportation charges. Each kit contains an installation diagram showing where the relay is mounted and how the wires are connected.

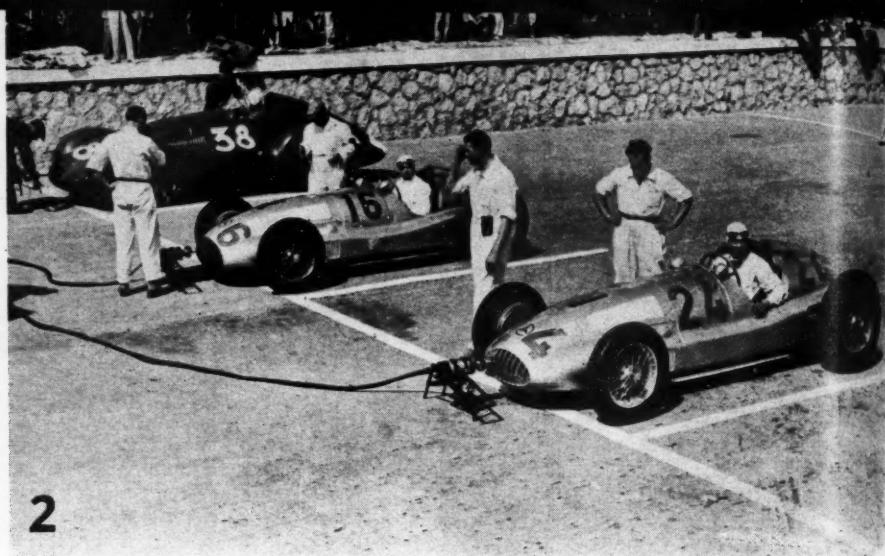
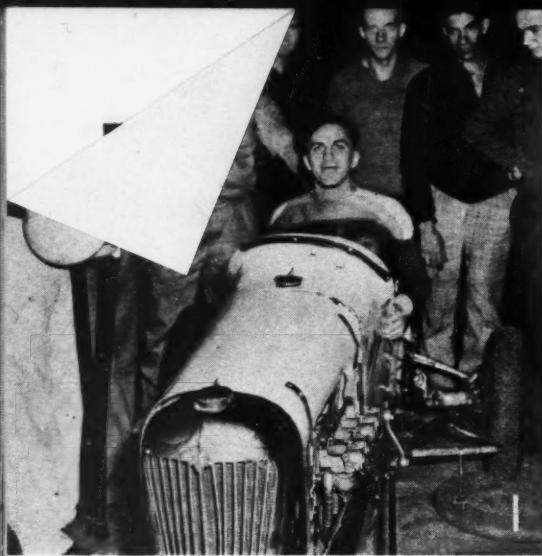
#### Revised Oil Seal

The timing gear cover oil seal on Studebaker Champion models is being changed from a rawhide type seal to the felt washer type construction as used on Studebaker Commander cars. The change entered production with engine serial No. 11259.

Kit, part No. 197656, has been released for service only. This kit consists of the new cover and washer assembly, an oil throw ring and a new fan drive pulley. These parts will change over the old type to the latest construction.

When the timing gear cover is, for any reason, removed from the engine, it is important that in replacing it, the crankshaft fan pulley be installed on the crankshaft and the timing gear cover oil washer properly centered on the crankshaft fan pulley before the cover bolts are tightened.





2

## Doctor Fosters Better Racing Relations

**Dayton Physician was Father to Central States Racing Association**

While confining his own auto racing to contests with the stork, a Dayton, Ohio, physician, Dr. Jesse K. Bailey, during the past few years has made some notable contributions to the sport of the roaring road.

Doctor Bailey godfathered the Dayton Speedway, and later conceived his brain child—the Central States Racing Association. Activities of this child, now grown lusty, have helped greatly in the work of putting dirt track racing on a more creditable footing.

Back in 1932 this polished Dayton physician accompanied a racing-fan police sergeant of the city on a trip to Winchester, Ind., to view a dirt track contest. Medico Bailey believes he there developed his passion for castor oil, for upon his return he set about interesting Dayton business men in building a local speedway. The doctor's racing fever mounted and from his high temperature he brought forth the Central States Racing Association. Highlight and feature of this group's activities are in its work in bringing about more humane and equitable relationships among track owners, promoters, drivers and mechanics.

First move of Dr. Bailey was to set up a contingent fund to take care of hospitalization of injured drivers. He found that in many cases in the middle west drivers hurt in racing accidents were being denied entry to hospitals and even medical care, for they were often broke and had nobody to vouch for them.

Into this fund the driver put a dollar, and the mechanic 75 cents. Track owners then matched these payments, and funds thus collected were held in trust by responsible individuals to assist unfortunate drivers and mechanics. All participated mutually in the benefits.

This in itself was a big step, and was made by the association in spite of the fact that many said it couldn't be done. But the Dayton physician wasn't through.

He studied the history of similar organizations and read mostly a record of failure and misrepresentation.



**Dr. Jesse K. Bailey**

But he soon came across J. Alexander Sloan, of Des Moines, and learned of the work Mr. Sloan and his associates were carrying on to stabilize racing through their organization, the International Motor Contests Association. This led Dr. Bailey to have his group affiliate with the I. M. C. A., and many advances have been made since in coordinating races throughout the middle west; assuring drivers and mechanics of honest purses and a square pay-off; identification of promoters and drivers; scheduling of tracks, and other valuable innovations.

Doctor Bailey held no office in the Central States Racing Association, and he modestly disclaims any honors or special mention for the work he has done. But he maintains a keen interest in furthering the association work, being now wholly under the spell of the roaring motors and the fascinating aroma of the castor oil.

### Snyder Killed

#### **In Midget Crash**

Just as MOTOR AGE went to press news was received that Jimmy Snyder, 31-year-old speed star who finished second in this year's Indianapolis

classic, was killed in a midget crack-up at Cahokia, Ill. Snyder's car hit an outer guard rail and rolled back into the track where it was struck by another midget driven by Paul Armbruster. Armbruster suffered severe burns.

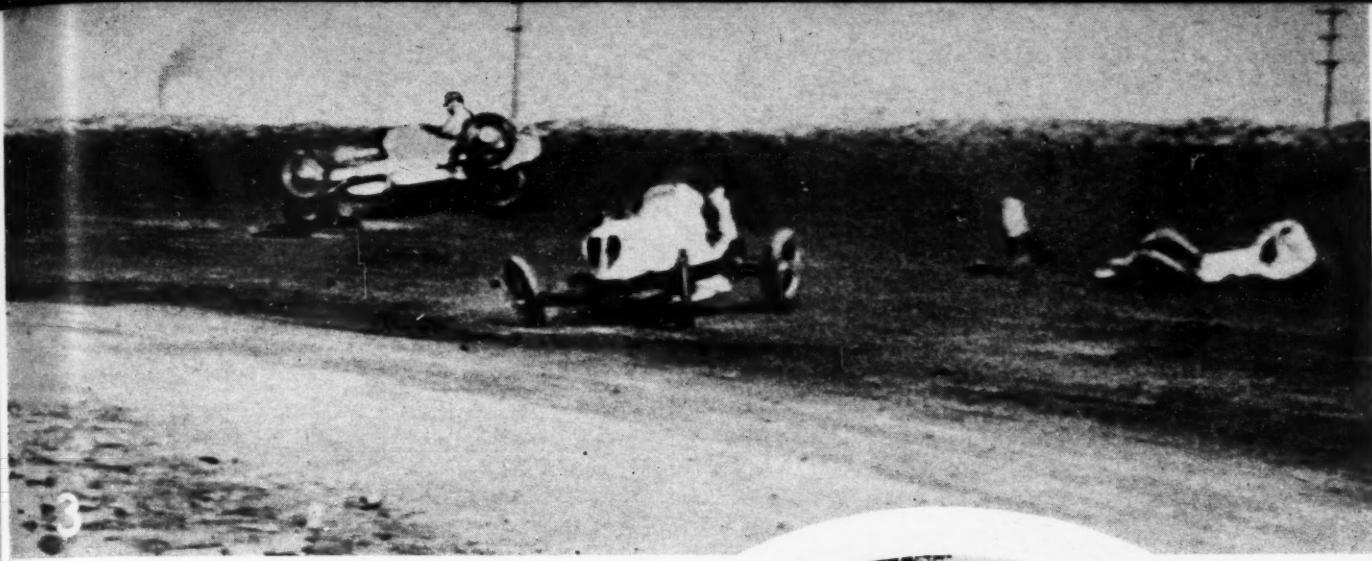
With two more National Championship automobile races on the schedule of the American Automobile Association's Contest Board, a battle for the diamond-studded gold medal designating the title holder is being maintained.

Despite the common acceptance that the Indianapolis winner will become king of the speed realm for the year, his supremacy will not be definitely determined until the 100 mile National Championship classic is run at the New York State Fair, Syracuse, on Sept. 2. It is possible, too, that the battle for the speed crown may terminate Aug. 27, with the century grind at the Wisconsin State Fair, Milwaukee. The uncertainty of who will wear the twenty-fourth championship medal of the AAA Contest Board could end at Milwaukee—if Wilbur Shaw, this year's Indianapolis winner, should come up with a front rank position in the final tally in the Wisconsin State Fair classic.

Milwaukee and Syracuse will each allow 200 points for first place. Therefore, if Shaw should fail to earn credits in those events and if Bergere should win two without Shaw adding more points, the championship picture would change.

### **Body Repair Kit**

Straightening all-steel bodies need no longer be a job to back away from. The new Ausco body repair kit introduced by the Auto Specialties Mfg. Co., of St. Joseph, Mich., provides a tool that will do the job quickly, whether the requirements be that of pushing, pulling or pressing. The standard Ausco Kit contains 14 attachments, the Deluxe set has 23 attachments including body spoons and length adjuster, while the Master set has in addition to others, all pushing, pulling, spreading and clamping attachments. For complete information, write the manufacturer.



4



## Oldfield Gets "Cold Shoulder" for Race Attacks

Recent newspaper attacks upon automobile racing as a sport, credited to Barney Oldfield, are said to have sent the American Automobile Association's Contest Board into a "huddle" to determine what if anything, should be done to penalize the once-popular speed hero for what is frowned upon as an unfair attack on the sport.

Periodically in recent years, newspapers from coast to coast have quoted Oldfield as objecting to automobile racing "in its present form" and have reported a wholesale attack upon racing by the racing pioneer.

The most recent "blast" came after the Indianapolis race on Decoration Day. In that piece, Oldfield was quoted as objecting to the Indianapolis classic and was reported as insisting that automobile racing has "served its usefulness" as a laboratory of automobile advancement.

Other reported attacks on the sport by Oldfield have been allowed to go by without official rebuttal by the AAA Contest Board. However, it is reported that the national governing body of the sport has seriously considered if it should call Oldfield "on the carpet" to decide whether he is correct in his assumption, which is strenuously denied by speed experts.

A definite move toward giving Oldfield "the cold shoulder" came in mid-June when Oldfield's name was dropped from all publicity regarding the July 4 All American Stock Car race at Langhorne Speedway. Oldfield had been heavily publicized as director of events for the stock car event. However, any connection he had with that race was suddenly dropped from all pre-race stories. It was said in some quarters that the action resulted from notification in official quarters.

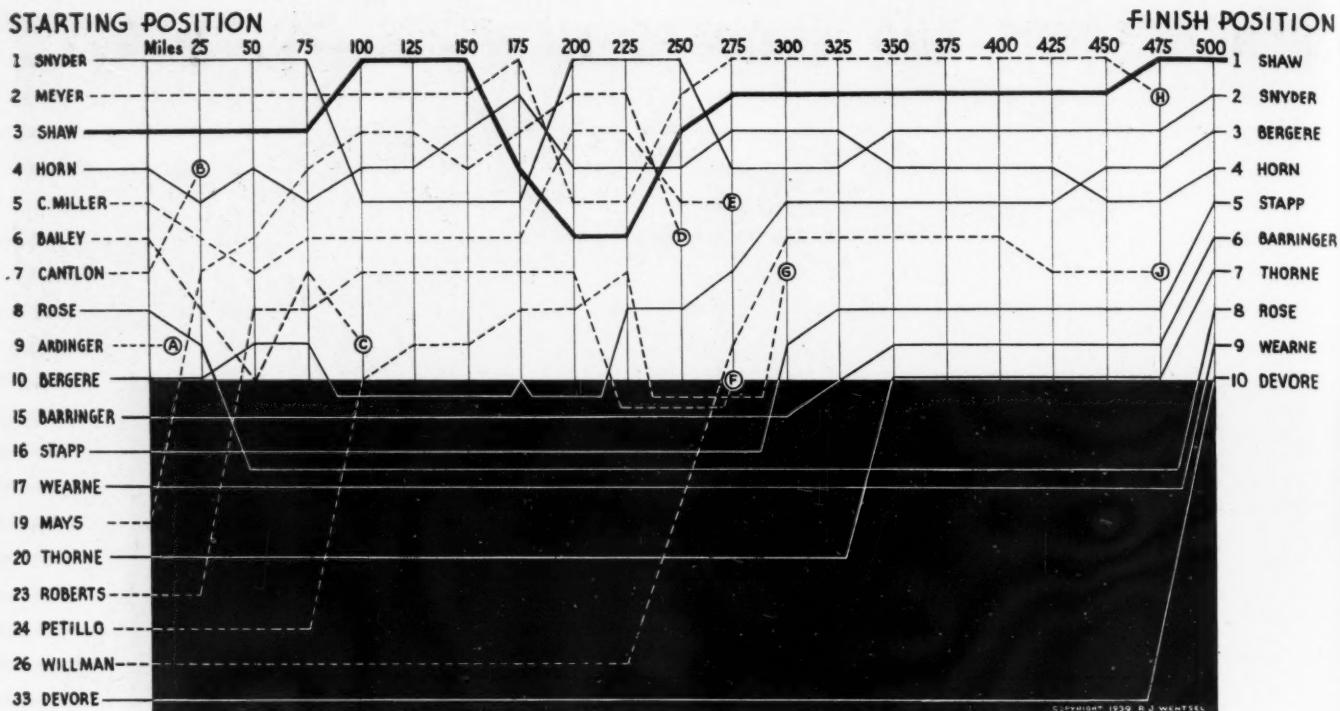
Unlike results of other attacks on the sport said to have come from Oldfield, the latest had the racing fraternity "up in arms." The gossip was definite in insisting that Oldfield owed whatever success he might have gained to his participation in automobile racing and objected to his attack following his retirement.

1. Bill Schindler doesn't let the loss of one leg hinder his activities on the mid-get circuit. Despite his handicap, Bill makes his competitors eat dust. Here Bill is shown in his car just after winning the main event at a meet last month at Coney Island, N. Y.

2. Cars in the Tripoli, Libya, Grand Prix race have their engines started by electric cranking machines just before the start of the 140-mile competition. Herman Lang, German driver, won the race with a Mercedes, averaging more than 118 m.p.h. Fifteen thousand spectators saw the race, part of which was run over the Littorania highway which crosses Libya from Tunisian to Egyptian borders. Famed Marshal Italo Balbo, of Italy, flagged the drivers for the start of the dangerous race.

3. Disaster overtook two drivers as they competed in a consolation event on the new track at Hammond, Ind. The cars locked wheels and broke clear just before the picture was snapped. Ralph Fons, Chicago driver, can be seen at the right lying on the track after being hurled from his car (center), while the machine driven by "Cyclone" Ross goes into a spin before turning turtle. Both drivers were seriously injured.

4. A sad memory to race fans now is the three-car tangle in which Floyd Roberts was killed and Bob Swanson and Chet Miller badly injured at Indianapolis Speedway in the Memorial Day classic. Photo shows Swanson's car being consumed by roaring flames shortly after being struck by the cars driven by Roberts and Miller.



#### "IN THE MONEY" FINISHERS

A clear picture of how the first ten in the Indianapolis Race fared throughout the 500 miles may be obtained by studying the above chart. A few of the prominent drivers who failed to finish have been charted together with the reasons why they dropped from the grind. As indicated in the letters on the chart reasons for failure to finish were: (A) Broken crankshaft, (B) Broken oil line, (C) Broken valve, (D) Blown piston, (E) Wreck, (F) Wreck, (G) Broken clutch, (H) Wreck, (J) Faulty ignition.

### License Name Plates Carry Dealer Name

License name plates, recognized by dealers as a highly efficient and economical medium of advertising, have taken on new dress and now offer several additional advantages. The plate now being made available by Advertising Specialties, Inc., 3126 Monroe St., Toledo, Ohio, is made of rust and tarnish proof aluminum with the dealer's name, town and emblems embossed on a colored background. Write the manufacturer for prices.

### Fulton Adds New Accessories

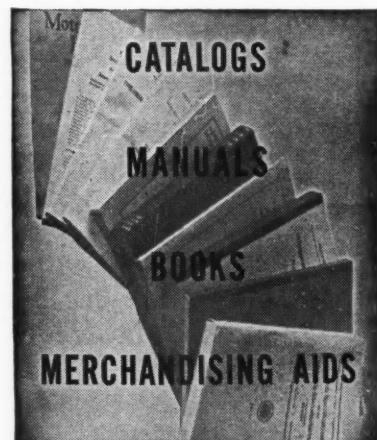
Several items of interest to the salesman and mechanic have been added to the line of accessories manufactured by the Fulton Co., 1912

South 82nd St., Milwaukee, Wis. Included are three-bar, rail-type guards for grilles, fenders, lamps and trunks of late model cars, and a new type safety latch for four-door cars with front and rear doors closing against the center post. For complete details and prices, write the manufacturer.

### Powell Becomes Hollingshead Eastern Field Manager

Appointment of Miles Powell to the position of eastern field manager of the R. M. Hollingshead Corp., manufacturer of automotive chemicals, has been announced by L. M. Olson, national sales manager.

Formerly Camden, N. J., division manager and for the past two years Pittsburgh division manager, Mr. Powell assumes supervision of all salesmen in territories east of the Mississippi River.



"How To Make More Money with Ramco 10-Up" complete details concerning the construction features of the Ramco 10-Up Piston Ring combination and Ramco sales plan now being used to increase sales. Write Ramsey Accessories Mfg. Corp., St. Louis, Mo., Dept. MA.

Maintaining a steady flow of work has long been a problem with a big majority of service men. Through an extended study of this problem the Gatke Merchandising Staff has developed a unique service selling plan based on the experience of many successful service men.

This ingenious plan ties in with the current safety programs by emphasizing the necessity of frequent brake checks and good break service for safe driving in modern traffic. It includes effective point-of-sale advertising and a brand new idea in per-

(Continued on page 56)



### "LIQUID COAL"

Expected to cost less than gasoline is "liquid coal," a fuel developed by the Armour Institute, Chicago. The fuel is fine particles of coal suspended in light oil. Engine is started on gasoline and then switched to the fuel shown being poured into an auxiliary tank on a car by Dr. F. W. Godwin of the institute. Further research is said to be necessary to perfect the "liquid coal."

# WHEN DUSTERS AND GOGGLES WERE "IN THE MONEY"



FITZGERALD  
STOOD FOR GASKET QUALITY...  
JUST AS IT DOES TODAY!



● Cash in on the high quality and long wear that have made the complete Fitzgerald line profitable for the dealer for thirty-three years.

Scientific construction from the finest tested materials makes every Fitzgerald gasket first choice for real service. And that means better business, more satisfied customers.

If it's a gasket or grease retainer, ask for a Fitzgerald—the complete line that completely satisfies—since 1906. Send for free copy new Gasket-Getter Chart No. 103, listing sets exclusively.

Ask about the famous Fitzgerald Bulldog Gasket for your heavy-duty, high-compression jobs. Best where the going is toughest.

The Fitzgerald Manufacturing Company, Torrington, Connecticut. Branches, Chicago and Los Angeles—New York Office—Canadian FITZGERALD Limited, Toronto.

## The FITZGERALD Line

Copper Asbestos Gaskets

Metal Core Asbestos Gaskets

FITZ-Rite Gaskets

Cork Gaskets

Gaskets of many other types, materials, and construction

Grease Retainers

# FITZGERALD GASKETS

SINCE  
1906

THE COMPLETE LINE THAT COMPLETELY SATISFIES

## Antique Lubricators

(Continued from page 20)

stations throughout the country are kidding themselves into believing that their old equipment is perfectly all-right, it's handling their business like a major. They can prove it to you, because as they will tell you, never once has any of their customers kicked about the job or the service—and after all that tells the story. That's where they are all wrong. Motorists today are ten times as finicky about lubrication as they were just five years back. The automobile manufacturers plus the major oil companies have been

preaching such a rip snorting sermon to the motorist on the necessity of good lubrication that the motorist has reached the point where he even wants to supervise the job on his car. This fact in itself ought to prove that they are smart enough to know you shouldn't use a hammer on their cars, when a wrench is the proper tool. In other words, you can't use old obsolete lubricating guns to lubricate Tom, Dick and Harry's car and get away with it very often or very long. It's true he may not register an official kick, but he will pay his bill, cuss a bit to himself, pick up his marbles and go elsewhere the next time—and elsewhere is to a modern equipped station.

The very essence of the phenomenal yearly automobile sales is change in styles, design, and motors. With such changes appearing yearly it stands to reason that lubricating equipment must change also in order to render an efficient job of lubrication. It certainly doesn't make good sense to think that you can build up a business by using ten year old methods and equipment in a field that is fast, furious and changeable. Let the dead past bury its dead, and that goes for old equipment. A good looking service station helps a lot in this business, but the best looking station in the world will never hit its quota if equipped with "Old Dobbin" guns. If you have the proper lubricating equipment don't worry much about prices, you can always get a good price when you render a good job and good jobs can only be done by using up-to-date equipment. The mere fact that the customer's attention is attracted by good looking, modern equipment, goes much further than you think to sell him on you lubrication service. When the appearance of formidable equipment in itself impresses the customer, how much more will that same equipment sell him once it gets into action. It's not necessary for him to be an expert mechanic to appreciate the value of good equipment.

Remember this: good, modern lubricating equipment will easily pay for itself in a very short time because it will positively increase your present volume of business plus the fact that in hundreds of cases it paves the way to better prices. If you are one of those skeptical gentlemen who want to be shown on this price angle let me suggest that you try raising the price on your lubrication right now, that is if you are equipped with "run down in the heel" equipment. You will not only see the answer, you will feel it—in a good substantial loss of business. Get rid of those dirty, old, obsolete rat traps masquerading under the name of grease guns because, no matter how you figure, they are costing you money and positively not worth their keep.

Regardless of where you are located, look around your town and see what the well dressed, well managed, and successful station is wearing, one thing you can be sure of: It will have new clothes in the form of modern equipment. Whether you like it or not the fact remains that if you want to make money in this business of lubrication you will have to do what all successful businesses do . . . go modern and stay modern with new equipment.

## What's in a Name?

(Continued from page 16)

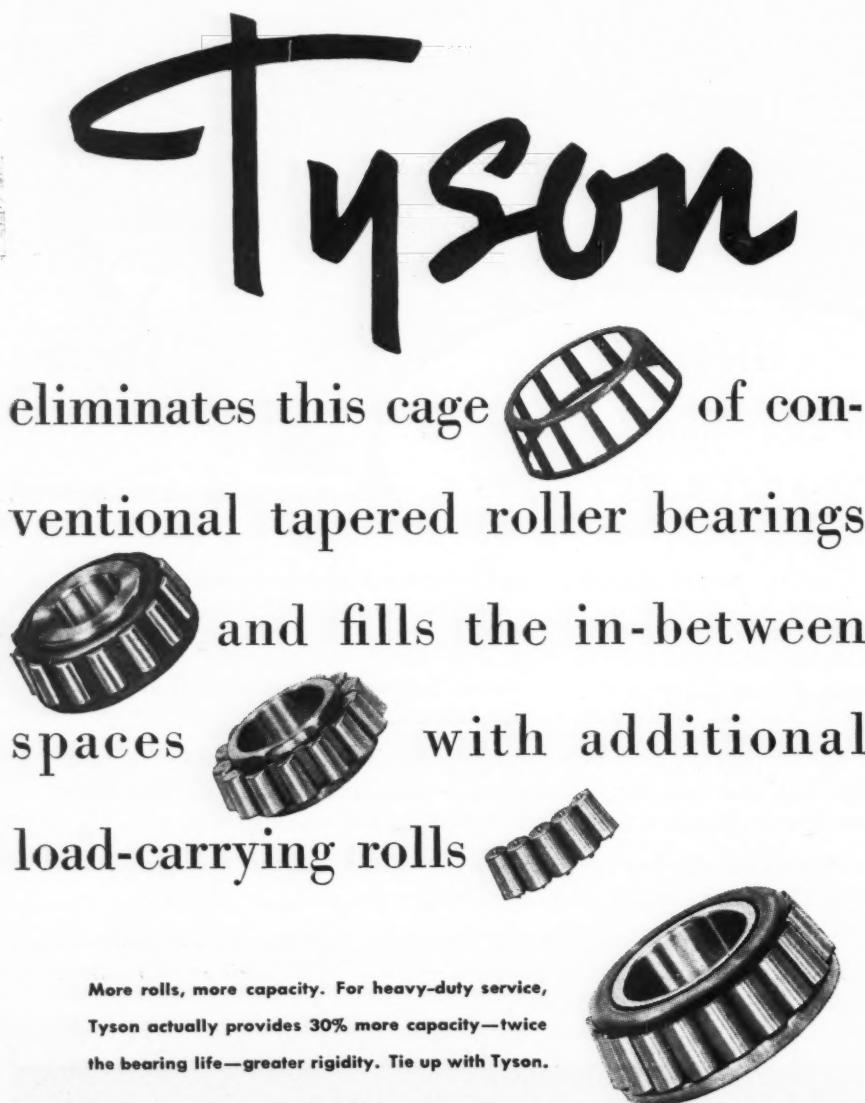
merchandising slanted for this angle, the shop will go ahead.

Even the building of Psenner-Pauff has been given an "angle." First, it is of arresting design. Second, the exterior attracts further attention by utilization of a huge electric clock which is lighted at night so that passing motorists can always check their watches, and by a large thermometer which gives the temperature at any time of day or night.

In conclusion, it is such care about the little things which build the automotive establishment into a big thing.

**Tyson**

eliminates this cage of conventional tapered roller bearings and fills the in-between spaces with additional load-carrying rolls



More rolls, more capacity. For heavy-duty service, Tyson actually provides 30% more capacity—twice the bearing life—greater rigidity. Tie up with Tyson.

*Cageless FOR HARD SERVICE Cage-type FOR REGULAR SERVICE*

**Tyson**

TYSON ROLLER BEARING CORPORATION, MASSILLON, OHIO

# PARTS NUMBERS AND PRICES

## Chevrolet-Series JB-Master 85-6 Cylinder 1939

### FRONT AXLE

Part No.	No.	Price
3650744—Center	1	\$11.50
602446—Knuckle	2	.45
602690—King pin set	1	.75
602491—King pin	2	.65
593044—King pin bush	4	.30
352569—Pin thrust brg.	2	.40
366704—King pin lock pin	2	.16
593047—Tie rod	1	1.00
602663—End unit, R. & L.	1	.26
593055—Knuckle arm, L.	1	3.00
593051—Knuckle arm, R.	1	1.45
599885—Front wheel	2	.75
354613—Front wheel hub	2	2.50
370465—Front hub bolt	12	.10
602432—Front brake drum	2	3.50
909002—Wheel brg. in	2	.290
909001—Wheel brg. out	2	1.95
335448—Grease felt	2	.10
602531—Backing plate	2	2.25
599748—Front hub cap	2	.90

### STEERING

Part No.	No.	Price
603389—Drag link assem.	1	2.60
595586—Ball seat	4	.15
335976—Seat spring	2	.20
350387—Pitman arm	1	1.45
350390—Pitman arm bush	2	.15
350389—Pitman arm ball	1	.40
264334—Cross shaft	1	4.50
261578—Cross shaft bush	2	.25
264270—Cross shaft housing	1	2.35
264267—Gear housing	1	3.45
264333—Tube and worm	1	3.75
5BC—Worm brg. cone	2	.85
6A—Worm brg. cup	2	.69
365027—Jacket tube	1	2.25
1854761—Jacket tube bush	1	.60
753325—Steering wheel	1	5.00
985427—Steering wheel Del.	1	9.90

### COOLING

Part No.	No.	Price
3112128—Rad. core assem.	1	22.00
350339—Radiator grille, L.	1	2.90
985408—Heat indicator	1	2.50
985128—Thermostat	1	1.00
838903—Water pump assem.	1	4.00
598133—Pump impeller	1	.50
885159—Shaft bearing	1	3.00
838822—Pump seal	1	.25
838279—Fan blades	1	1.15
888282—Fan belt	1	.75

### FUEL AND EXHAUST SYSTEMS

Part No.	No.	Price
838938—Carburetor assem.	1	12.00
1515483—Gas tank gauge	1	1.50
1515355—Gas gauge	1	2.00
350974—Choke wire & button	1	.50
1523429—Fuel pump, exch.	1	2.00
1521573—Pump diaphragm set	1	.60
839005—Inlet manifold	1	3.45
602366—Exhaust manifold	1	5.70
350961—Muffler	1	3.75
350506—Tail pipe	1	1.90
350505—Exhaust pipe	1	1.95

### ENGINE GASKETS

Part No.	No.	Price
838982—Carb. to mani.	1	.20
838263—Fuel pump	1	.03
593606—Exh. pipe packing	1	.15
602483—Manifold set	1	.35
838290—Inl. to exh. mani.	1	.15
838272—Cylinder head	1	.60
602512—Cylinder head set	1	1.40
602373—Oil pan set	1	.35
602374—Oil pan seal	2	.05
603158—Timing case seal	1	.45
838206—Timing case cover	1	.10
602336—Valve side plate	1	.25
838337—Valve rocker cover	1	.30
838341—Water outlet	1	.05
838137—Water pump to cyl.	1	.03
838150—Water pump cover	1	.05
838196—F. mounting plate	1	.10

### ENGINE PARTS

Part No.	No.	Price
603399—Block assembly	1	88.00
602977—Cylinder head	1	21.50
595219—F. rubber mounting	2	.85
377928—Side cushion	2	.75
603401—Cylinder block only	1	40.00
838866—Oil pan	1	6.50
838345—Crankshaft	1	25.30
838733—Camshaft	1	7.60
603447—Vibration damper	1	4.60
838662—Flywheel	1	6.00
602697—Piston & pin	6	2.25
838543—Compression ring	12	.30
602305—Oil ring	6	.40
838407—Piston pin	6	.55
602318—Piston pin bushing	12	.17
345428—Pin clamp screw	6	.07
602235—Con. rod exch.	6	1.75
838437—Inlet valve	6	.55
838717—Exhaust valve	6	.60
838704—Valve spring	12	.15
837801—Valve spg. cap, exh.	6	.06
838539—Valve spring seat	12	.03
838029—Valve key	24	.03
601806—Inlet valve guide	6	.25
602978—Exhaust valve guide	6	.25
838774—Valve lifter	12	.50

### Part No. ENGINE PARTS—continued

Part No.	No.	Price
837385—Valve adj. screw	12	\$0.10
124929—Adj. screw nut	12	.02
838409—Valve push rod	12	.30
838993—Inlet rocker arm, L.	3	.65
838999—Exhaust rocker arm	6	.65
838244—Rocker arm shaft	2	.85
838432—Crankshaft gear	1	.95
838436—Camshaft gear	1	3.75

### MAIN BEARINGS

Part No.	No.	Price
838410—No. 1 upper	1	.75
838411—No. 1 lower	1	.75
838412—No. 2 upper	1	.75
838413—No. 2 lower	1	.75
838414—No. 3 upper	1	.90
838415—No. 3 lower	1	.90
838416—No. 4 upper	1	.90
838417—No. 4 lower	1	.90

### ENGINE OILING

Part No.	No.	Price
838440—Oil pump assem.	1	4.00
838441—Oil pump body	1	1.70
838450—Pump shaft & gear	1	1.10
838444—Pump idler gear	1	.60
838916—Distributor valve	1	.25
837636—Dist. valve spring	1	.02
838449—Relief valve spring	1	.06
1505887—Oil pressure gauge	1	1.00

### CLUTCH

Part No.	No.	Price
602955—Housing	1	7.20
CT22—Release bearing	1	3.50
603565—Disc & facing	1	4.25
837749—Disc facing	2	.60
838948—Pressure plate	1	3.15
838782—Diaphragm spring	1	2.00
590939—Spline shaft	1	5.50
99004—Pilot bearing	1	1.15
43207C—Spline shaft brg. R.	1	3.30

### TRANSMISSION

Part No.	No.	Price
Steering Column Shift see Model	JA	
590976—Case	1	7.50
598827—Countershaft	1	1.10
590823—CS. gear cluster	1	5.90
603196—Mainshaft	1	1.10
590752—Mnshft. pilot brg.	14	.02
43305C—Mnshft. brg. R.	1	3.30
590903—Second speed gear	1	4.15
590928—Reverse idler gear	1	4.00

### UNIVERSALS

Part No.	No.	Price
373536—Prop. shaft yoke	1	2.10
351888—Trunnion bearing	4	.30
347658—Joint ring	2	.75
593036—Propeller shaft	1	5.00
595007—Shaft bushing, F.	1	.50
595005—Shaft bushing, R.	1	.55
595638—Shaft oil seal	1	.35

### REAR AXLE

Part No.	No.	Price
602462—Joint assembly	1	5.50
593025—Trans. flange	1	1.90
373536—Prop. shaft yoke	1	2.10
351888—Trunnion bearing	4	.30
347658—Joint ring	2	.75
593017—Cover gasket	1	.12
602439—Carrier & torque tube	1	16.00
593012—Diff. carrier gasket	1	.10
593019—Differential case	1	5.20
472535—Differential pin	1	.50
472515—Differential pinion	2	1.00
365103—Diff. side gear	2	2.00
602440—Pinion & ring gear	1	11.25
596529—Ring gear screw	10	.05
530636—Pinion bearing, F.	1	7.80
530636—Pinion bearing, R.	1	3.95
KA11360Z—Diff. bearing	2	4.35
603617—Axle shaft, L.	1	5.25
472613—Axle shaft lock	2	.05
472598—Grease retainer	2	.45
C1500—Axle shaft bearing	2	.45
IR1500—Axle brg. in race	2	.45
602104—Rear brake drum	2	1.20
475469—Backing plate, L.	1	1.25

### FRONT SPRING

Part No.	No.	Price
350225—Assembly	2	4.30
477258—Front bolt	2	.35
379648—Spg. & hanger bush.	6	.20
373199—Shackle pin	4	.25
495034—Shackle link	4	.25
601231—Spring clip	4	.30

### REAR SPRING

Part No.	No.	Price
599983—Assembly	2	7.55
474838—Front bolt	2	.10
751005—Front eye bushing	2	.40
379648—Spg. & hanger bush.	4	.20
373199—Shackle pin	4	.25
601231—		

# Mechanical Specifications

These Specifications Are Brought Up-to-Date Each Month by the

Line Number	MAKE AND MODEL	Lowest Priced 4-d. Sed. (Div'd.)	Wheelbase (In.)	Tire Size (In.)	ENGINE												CHASSIS									
					No. of Cylinders, Bore and Stroke	Taxable H.P.	Piston Displacement (Cub. In.)	Maximum Brake H.P. at Specified R.P.M.	Compression Ratio (10-1)	Displacement Factor $\frac{S}{C}$	Cylinder Head Material	Camshaft Drive Make	Piston Material	Oil Cleaner Make	Air Cleaner Make	Carburetor Make	Muffler Make	Electrical System Make	Battery Make	Clutch	Gears	Universal Type and Make	Rear Axle Type and Make	Rear Axle Ratio	Front Spring	Suspension
1	Bantam	60	497½	75½	5.00/15	4-2.2x3.0	7.75	45.6	20-4000	7.00	23.0	CI	Own	Als	No	Don	Til	Buf	AL	USL	P.Ro	WG	m-UP	½ Spi	5.25 Tr	0
2	Buick	39-40	996	120	6.50/16	8-3½x4½	30.6	248.0	107-3400	6.10	39.9	CI	LB	Als	No	AC	Car	Wal	DR	Del	P.Own	Own	Rb-Mec	½ Own	4.44 IC	0
3	Buick	39-60	1246	126	7.00/15	8-3½x4½	37.8	320.2	141-3600	6.25	42.3	CI	LB	Als	No	AC	Str	Wal	DR	Del	P.Own	Own	Rb-Mec	½ Own	3.90 IC	0
4	Buick	39-80	1543	133	7.00/16	8-3½x4½	37.8	320.2	141-3600	6.25	39.4	CI	LB	Als	No	AC	Str	Wal	DR	Del	P.Own	Own	m-Spi	½ Own	4.18 IC	0
5	Buick	39-90	2074	140	7.50/16	8-3½x4½	37.8	320.2	141-3600	6.25	38.5	CI	LB	Als	No	AC	Str	Wal	DR	Del	P.Own	Own	m-Spi	½ Own	4.55 IC	0
6	Cadillac V8-39-61-60S	1680	126-127	7.00/16	8-3½x4½	39.2	346.0	135-3400	6.25	44.5	CI	Mor	Als	No	AC	Str	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	3.92 IC	0	
7	Cadillac V8-39-75	1995	141	7.50/16	8-3½x4½	39.2	346.0	140-3400	6.70	40.1	CI	Mor	Als	No	AC	Str	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	4.58 IC	0	
8	Cadillac V-16-39-90	5140	141	7.50/16	16-3½x3½	67.6	431.0	185-3600	6.75	44.3	CI	Mor	Als	No	AC	Car	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	4.31 IC	0	
9	Chevrolet, Master 85	689	112½	6.00/16	6-3½x3½	29.4	216.5	85-3200	6.25	35.2	CI	Own	CI	No	AC	Car	Var	DR	Del	P.Own	Own	p-Own	½ Own	3.73 IC	0	
10	Chevrolet, Mas. Del.	720	112½	6.00/16	6-3½x3½	29.4	216.5	85-3200	6.25	39.2	CI	Own	CI	No	AC	Car	Var	DR	Del	P.Own	Own	p-Own	½ Own	4.22 IC	0	
11	Crosley	325½	80	.....	2-3x2½	.....	38.9	15-4200	5.00	.....	.....	CI	.....	.....	.....	.....	Til	.....	AL	.....	P.Ro	WG	None	½ Spi	5.14 C	0
12	Chrysler, Roy. C-22	1010	119	6.25/16	6-3½x4½	27.3	241.5	100-3600	6.50	38.5	CI	Mor	Als	Pur	AC	Car	NS	AL	Wil	P.B&B	Own	Nb-UP	½ Own	4.10 IC	0	
13	Chrysler, Imp. C-23	1198	125	7.00/16	8-3½x4½	33.8	323.5	130-3400	6.80	42.5	CI	MW	Als	Pur	AC	Str	NS	AL	Wil	P.B&B	Own	Nb-UP	½ Own	3.91 IC	0	
14	Chrysler, Cus. I.M. C-24	2595	144	7.50/16	8-3½x4½	33.8	323.5	132-3400	6.80	.....	AI	MW	Als	Pur	AC	Str	NS	AL	Wil	P.B&B	Own	Nb-UP	½ Own	4.90 IC	0	
15	De Soto De L.C. S-6	970	119	6.00/16	6-3½x4½	27.3	228.1	93-3600	6.50	37.7	CI	Mor	Als	Pur	AC	Car	NS	AL	Wil	P.B&B	Own	Nb-UP	½ Own	4.10 IC	0	
16	Dodge Sp. & Del. D-11	855	117	6.00/16	6-3½x4½	25.3	217.8	87-3600	6.50	38.3	CI	Mor	Als	Pur	AC	Str	NS	AL	AL	P.B&B	Own	Nb-UP	½ Own	4.10 IC	0	
17	Ford V8-60	922-A	665½	112	5.50/16	8-2.6x3.2	21.6	136.0	60-3500	6.60	30.7	AI	Di	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Spi	¾ Own	4.44 Tr	0
18	Ford V8-65	91-A	705½	116	6.00/16	8-3½x3½	30.0	221.0	85-3800	6.75	38.2	CI	Di	CS	No	Yes	Str	Own	O	Own	P.Os	Own	m-Spi	¾ Own	3.78 Tr	0
19	Graham Spec. & Cus. 96	965	120	6.00/16	6-3½x4½	25.3	217.8	90-3600	6.50	36.8	CI	LB	Als	No	AC	Mar	Old	DR	Wil	P.Long	WG	Nb-UP	½ Spi	4.27 C	0	
20	Graham Sc. & Cus. 97	1095	120	6.25/16	6-3½x4½	25.3	217.8	116-4000	6.70	.....	AI	LB	Als	No	AC	Fram	Mar	Old	DR	Wil	P.Long	WG	Nb-UP	½ Spi	4.27 C	0
21	Hudson 112	90-98	806	112	6.00/16	6-3x4½	21.6	175.0	86-4000	6.50	33.3	CI	GED	AI	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11 C	0
22	Hudson	91	854	118	6.00/16	6-3x5	21.6	212.0	96-3900	6.25	.....	CI	GED	AI	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11 C	0
23	Hudson-Six	92	898	118	6.00/16	6-3x5	21.6	212.0	101-4000	6.25	38.1	CI	GED	AI	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11 C	0
24	Hudson-C.C. Six	93	995	122	6.25/16	6-3x5	21.6	212.0	101-4000	6.25	36.3	CI	GED	AI	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11 C	0
25	Hudson-C.C. 8	95-97	1079	122	6.50/16	8-3x4½	28.8	254.5	122-4200	6.25	40.9	CI	GED	AI	No	AC	Car	Old	AL	Nat	P.Own	Own	Nb-Spi	½ Own	4.11 C	0
26	Hupmobile, 6 R-915	895	115	6.00/16	6-3½x4½	29.4	245.3	101-3600	5.75	40.9	CI	Mor	Als	No	AC	Car	Old	AL	Wil	P.B&B	WG	m-Spi	½ Spi	4.27 C	0	
27	Hupmobile, 6.922E	995	122	6.25/16	6-3½x4½	29.4	245.3	101-3600	5.75	41.8	CI	Mor	Als	No	AC	Car	Old	AL	Wil	P.B&B	WG	m-Spi	½ Spi	4.54 C	0	
28	Hupmobile, 8-925H	1145	125	6.50/16	8-3½x4½	32.5	303.2	120-3500	5.80	43.2	CI	Mor	Als	No	AC	Car	Old	AL	Wil	P.Long	WG	m-UP	½ Spi	4.54 C	0	
29	La Salle V8, 39-50	1320	120	7.00/16	8-3½x4½	36.4	322.0	125-3400	6.25	41.7	CI	Mor	Als	No	AC	Car	Wal	DR	Del	P.Long	Own	Nb-Mec	½ Own	3.92 IC	0	
30	Lincoln V12	136-145	136-145	7.50/17	12-3½x4½	46.8	414.0	150-3400	6.38	39.1	AI	Mor	AI	Pur	AC	Str	Old	AL	Exi	P.Long	Own	m-Spi	FF Tim	4.58 C	0	
31	Lincoln-Zephyr	1360	125	7.00/16	12-2½x3½	36.3	267.0	110-3900	6.70	40.4	AI	Dia	CS	Pur	AC	Str	Old	O	P	Own	m-Spi	FF Tim	4.44 Tr	0		
32	Mercury V8-99A	934½	116	6.00/16	8-3½x17½	32.5	239.0	95-3600	6.15	36.9	CI	Dia	CS	.....	AC	Str	Own	O	P.Os	Own	m-Spi	¾ Own	3.54 Tr	0		
33	Nash Lafay	3910	117	6.00/16	6-3½x4½	27.3	234.8	99-3400	6.30	37.6	CI	Whit	Als	No	AC	Str	Wal	AL	USL	P.B&B	Own	Nb-Mec	½ Own	4.10 C	0	
34	Nash Amb. 6, 3920	985	121	6.25/16	6-3½x4½	27.3	234.8	105-3400	6.00	35.6	CI	Whit	Als	BS	AC	Car	Wal	AL	USL	P.B&B	Own	Nb-Mec	½ Own	4.10 C	0	
35	Nash Amb. 8, 3980	1235	125	7.00/16	8-3½x4½	31.2	260.8	115-3400	6.00	34.9	CI	Dia	Als	BS	AC	Car	Wal	AL	USL	P.B&B	Own	Nb-Mec	½ Own	4.10 C	0	
36	Oldsmobile	60	889	115	6.00/16	6-3½x3½	28.4	216.0	90-3200	6.20	39.3	CI	Whit	Als	No	AC	Car	Var	DR	Del	P.B&B	Own	Rb-Mec	½ Own	4.30 IC	0
37	Oldsmobile	70	952	120	6.00/16	6-3½x4½	28.4	229.7	95-3300	6.10	39.7	CI	Whit	Als	No	AC	Car	Var	DR	Del	P.B&B	Own	Rb-Mec	½ Own	4.30 IC	0
38	Oldsmobile	70	1043	120	6.50/16	8-3½x3½	33.8	257.1	110-3500	6.20	41.6	CI	LB	Als	No	AC	Car	Var	DR	Del	P.B&B	Own	Rb-Mec	½ Own	4.30 IC	0
39	Overland-39	595½	102	5.00/16	4-3½x4½	15.6	134.2	61-3600	6.35	35.0	CI	LB	AI	F-O	AC	Til	Mac	AL	USL	P.Long	WG	m-UP	½ Own	4.30 C	0	
40	Packard Six, 1700	1095	122	6.50/16	6-3½x4½	29.4	245.3	100-3200	6.52	40.1	CI	Mor	Als	Pur	Op	CG	Wal	DR	Wil	P	Own	Nb-Mec	½ Own	4.54 IC	0	
41	Packard Eight, 1701-2	1295	127	148	7.00/16	8-3½x4½	33.8	282.0	120-3600	6.41	42.0	CI	Mor	Als	Pur	AC	Str	Wal	AL	PD	P	Own	Nb-Mec	½ Own	(b) IC	0
42	Pack. Sup. 8, 1703-5	2038	127	148	7.00/16	8-3½x4½	32.5	320.0	130-3200	6.45	44.1	CI	Mor	Als	Pur	AC	Str	Old	AL	PD	P	Own	Nb-Mec	½ Own	(s) IC	0
43	Pack. Twelve, 1707-8	4155	134, 139	8.25/16	12-3½x4½	56.7	473.0	175-3200	6.30	44.1	CI	Mor	Als	Pur	AC	Str	Old	AL	PD	P	Own	Nb-Spi	½ Own	4.41 IC	0	
44	Plymouth	726	114	5.50/16	6-3½x4½	23.4	201.3	82-3600	6.70	36.0	CI	Mor	Als	No												

# Tune-Up Specifications

Car Manufacturers and Supersede All Others Previously Published

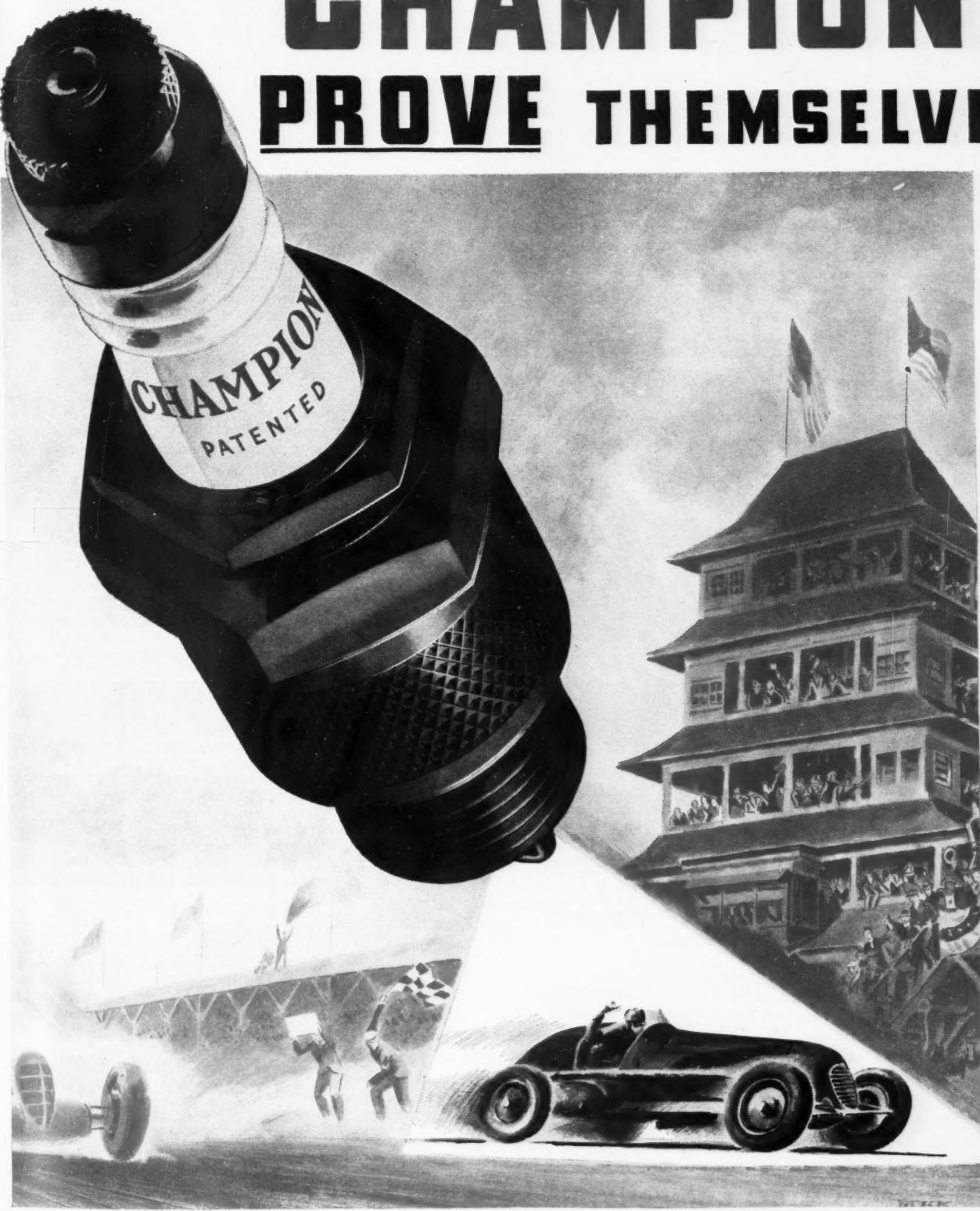
Service Brake Make and Type	Steering Gear Make	Compression Pressure at Cranking Speed (Lbs.)	Spark Plug	RINGS		VALVES						IGNITION						FRONT AXLE															
				Make and Type	No. and Width Comp.	Piston Pin Diameter	Piston Pin Locked In			Operating Tappet Clearance	Intake Valve Opens Before After T.C.	No. of Degrees	No. of Flywheel Teeth	Breaker Points Gap (In.)	Spark Gap (In.)	Spark Occurs °TC	No. of Flyw. Teeth Spark Occurs °TC	Crankpin Length (In.)	Capacity Crankcase (Qts.)	Caster (Degrees)	Camber (Degrees)	Toe-in (Inches)	King Pin Inclination (Degrees)										
							Inlet (In.)	Inlet Seat Angle (Degrees)	Exhaust Angle (Degrees)																								
OM R	125	AL-A9	2-3/8	1-1/8	1-1/8	7/8	R	1-1/2	45	1-1/2	45	.279	.011H	.012H	.011	19B	41/4B	.022	.025	TC	TC	Au	A	1-1/2	1-1/4	3	4	11	1-1/4	1-1/8	13/2	1	
OH S	112	AC-46	2(c)	2-3/8	2-3/8	7/8	R	1-1/2	45	1-1/2	45	.372	.015H	.015H	††	13B	51/4B	.015	.025	4B	11/2B	Au	A	2	1-21/2	6	13 1/2	N1/2-1/2	-1/4-+1/2	0-1/2	3/4-4/4	2	
OH S	114	AC-46	2(c)	2-3/8	2-3/8	7/8	R	1-1/2	45	1-1/2	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	21/2B	Au	A	21/2	1-31/2	8	17	N1/2-1/2	-1/4-+1/2	0-1/2	3/4-4/4	3	
OH S	114	AC-46	2(c)	2-3/8	2-3/8	7/8	R	1-1/2	45	1-1/2	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	21/2B	Au	A	21/2	1-31/2	8	17	N1/2-1/2	-1/4-+1/2	0-1/2	4-5/4	4	
OH S	114	AC-46	2(c)	2-3/8	2-3/8	7/8	R	1-1/2	45	1-1/2	45	.372	.015H	.015H	††	14B	6B	.015	.025	6B	21/2B	Au	A	21/2	1-31/2	8	17	N1/2-1/2	-1/4-+1/2	0-1/2	4-5/4	5	
BH S	155x	AC-104	2(c)	2-3/8	7/8	7/8	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	21/4B	Au	A	2-46	2-46	7	25	(nn)	(np)	3/4-3/2	(nr)	6	
BH S	170x	AC-104	2(c)	2-3/8	7/8	7/8	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	21/4B	Au	A	2-46	2-46	7	25	0-1/2	0-1/2	3/4-3/2	5/4-1'	7	
BH S	180x	AC-104	2(c)	1-1/8	1-1/8	7/8	R	1.50	45	1.37	45	.341	AA	AA	AA	6B	21/2B	.015	.032	6B	21/2B	Au	A	2	1-31/2	11	30	0-1/2	0-1/2	3/4-3/2	5/4-1'	8	
OH O	AC-44	2-1/2	1-1/2	1-1/2	1-1/2	1-1/2	R	1-1/2	30	1-1/2	30	.340	.006H	.013H	.006	9B	31/4B	.021	.040	5B	2B	Au	A	2-1/2	1-1/2	5	14	21/4-1/2	1-1/2	1-1/2	7/10'	9	
OH O	AC-44	2-1/2	1-1/2	1-1/2	1-1/2	1-1/2	R	1-1/2	30	1-1/2	30	.340	.006H	.013H	.006	9B	31/2B	.021	.040	5B	2B	Au	A	2-1/2	1-1/2	5	14	0-1/2	0-1/2	4-10/4	10		
HM R	AL	2-1/8	1-1/2	1-1/2	1-1/2	1-1/2	F	...	...	...	...	...	...	...	...	TC	TC	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11	
LH G	145x	AL-A7	2-1/8	2-1/2	2-1/2	7/8	F	1.88	45	1.63	45	.340	.008H	.010H	.014	8B	31/4B	.020	.025	TC	TC	Au	A	21/8	1-1/2	5	17	1/2-21/2	(a)	0-1/2	4-5/4	12	
LH G	155x	AL-A7	2-1/8	2-1/2	2-1/2	7/8	F	1.88	45	1.63	45	.340	.008H	.010H	.011	6B	21/2B	.018	.025	TC	TC	Au	A	21/8	1-1/2	6	24	N1/2-1/2	-1/2-+1/2	0-1/2	5/4-7	13	
LH G	155x	AL-AL6	2-1/8	2-1/2	2-1/2	7/8	F	1-1/2	45	1-1/2	45	.340	.008H	.010H	.011	6B	21/4B	.018	.025	3B	1-1/2	Au	A	21/8	1-1/2	6	24	1-3	1-3	4-5/4	14		
LH G	145x	AL-A7	2-1/8	2-1/2	2-1/2	7/8	F	1-1/2	45	1-1/2	45	.340	.008H	.010H	.014	8B	31/4B	.020	.025	2B	3/4B	Au	A	21/8	1-1/2	5	19	1/2-21/2	(a)	0-1/2	4-5/4	15	
LH G	140x	AL-A7	2-1/8	2-1/2	2-1/2	7/8	F	1-1/2	45	1-1/2	45	.340	.006H	.008H	.011	6A	21/4A	.020	.025	TC	TC	Au	A	21/6	1	5	15	N1/2-1/2	1-1/2	0-1/2	5/4-6	16	
LH G	150y	Ch-H-10	2-1/2	1-1/2	1-1/2	1-1/2	R	1-1/2	30	1-1/2	45	.341	.010H	.010H	.012	4-5B	11/2B	.018	.025	TC	TC	Au	A	2-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	8
LH G	100	Ch-H-10	2-1/2	1-1/2	1-1/2	1-1/2	R	1-1/2	30	1-1/2	45	.341	.010H	.010H	.012	4-5B	11/2B	.018	.025	4-5A	1-1/2	Au	A	2-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	18
OH R	120	Ch-H-10	2-1/2	2-1/2	2-1/2	1-1/2	R	1-1/2	30	1-1/2	45	.341	.010H	.010H	.012	4-5B	11/2B	.018	.025	TC	TC	Au	A	2-1/6	1-1/2	5	14	3-4	1	1-1/2	1-1/2	7/12	19
OH R	130	Ch-H-10	2-1/2	2-1/2	2-1/2	1-1/2	R	1-1/2	30	1-1/2	45	.341	.010H	.010H	.012	4-5B	11/2B	.018	.025	4-5A	1-1/2	Au	A	2-1/6	1-1/2	5	14	3-4	1	1-1/2	1-1/2	7/12	20
BH S	115	Ch-J-8	2-3/8	2-3/8	2-3/8	3/4	F	1-1/2	45	1-1/2	45	.340	.006H	.008H	.010	10-12B	3B	.020	.032	2-1/2B	91/4B	Au	A	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	21
BH G	120	Ch-J-8-A	2-3/8	2-3/8	2-3/8	3/4	F	1-1/2	45	1-1/2	45	.341	.006H	.008H	.010	10-12B	3B	.020	.032	TC	TC	Au	A	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	22
BH G	120	Ch-J-8	2-3/8	2-3/8	2-3/8	3/4	F	1-1/2	45	1-1/2	45	.340	.006H	.008H	.010	10-12B	3B	.020	.032	TC	TC	Au	A	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	23
BH G	118	Ch-J-8	2-3/8	2-3/8	2-3/8	3/4	F	1-1/2	45	1-1/2	45	.340	.006H	.008H	.010	10-12B	3B	.017	.032	TC	TC	Au	A	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	25
LH G	107	Ch-7	2-1/2	2-1/2	2-1/2	7/8	F	1-1/2	45	1-1/2	45	.341	.010	.014	.013	2B	1-1/2B	.022	.028	7B	21/4B	Au	A	2-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	26
LH G	107	Ch-7	2-1/2	2-1/2	2-1/2	7/8	F	1-1/2	45	1-1/2	45	.341	.010	.013	.014	2B	1-1/2B	.022	.028	7B	21/4B	Au	A	2-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	27
LH G	113	Ch-7	2-1/2	2-1/2	2-1/2	7/8	F	1-1/2	45	1-1/2	45	.341	.006	.013	.010	1B	1-1/2B	.015	.028	7B	21/4B	Au	A	2-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	28
BH S	155x	AC-104	2(c)	2-1/2	7/8	7/8	F	1.88	45	1.63	45	.341	AA	AA	AA	TC	TC	.015	.027	5B	21/4B	Au	A	21/2	2-1/2	7	...	N1/2-1/2	-0-3/4	1-1/2-3/2	5/4-6	29	
OM O	105	Ch-7	2-1/2	2-1/2	2-1/2	7/8	F	1-1/2	45	1-1/2	45	.341	AA	AA	AA	21B	63/4B	.020	.029	7B	21/4B	Au	B	21/2	2	12	32	1-1/2	1	1-1/2	1-1/2	30	
BH G	105	Ch-H-10	2-1/2	1-1/2	1-1/2	3/4	F	1.53	45	1.53	45	.311	AA	AA	AA	191/2B	6B	.015	.029	4B	1-1/2B	Au	A	21/2	1-1/2	5	30	3/4	1/2	1-1/2	1-1/2	31	
BH G	...	Ch-H-10	2-1/2	1-1/2	1-1/2	3/4	F	1-1/2	45	1-1/2	45	.310	013C	TC	TC	.015	.025	4B	1-1/2B	Au	A	2-1/2	1-1/2	5	21	8	1	1-1/2	1-1/2	32			
BH G	110	AL-B7-A	2-1/2	2-1/2	2-1/2	7/8	F	1-1/2	45	1-1/2	45	.340	.015	.015	.015	211/2B	6B	.020	.025	TC	TC	Au	A	2	1-2	6	20	1-2	0-1/2	0-1/2	7	33	
BH G	125	AC-45	2-1/2	2-1/2	2-1/2	7/8	F	1-1/2	45	1-1/2	45	.372	.015	.015H	.015	214/2B	7B	.020	.025	6B	2-1/2B	Au	A	2	1-2	6	16	1-2	0-1/2	0-1/2	7	34	
BH G	110	AC-45	2-1/2	1-1/2	1-1/2	7/8	F	1-1/2	45	1-1/2	45	.372	.015H	.015	.015	20B	6B	.020	.														

## **Motor Car Price, Weight and Body Table**

**Following are delivered prices at factory for cars with standard equipment and include all federal taxes with exception of Ford, Lincoln, Lincoln-Zephyr, Mercury, Overland and Willys. Optional equipment, state or local taxes, transportation charges and finance charges are extra.**

# CHAMPIONS PROVE THEMSELVES

THE BETTER SPARK PLUGS



## IN A 16 YEAR RECORD AT INDIANAPOLIS

In the last 16 Indianapolis 500 Mile Races... 151 out of the 160 cars finishing in the money  
... including 15 winners... the present qualifying and race record holders... and 9 of  
the first 10 in 1939... used dependable Champion Spark Plugs... truly an amazing record!

SELL THE SPARK PLUG CHAMPIONS USE

## Don't Forget Valves

(Continued from page 12)

ducted from the valve head, through the seat and into the cooling water in the water jacket. A narrow seat will tend to force the heat from the valve head and down the valve stem, where the additional heat results in valve sticking.

When reconditioning a valve seat, care should therefore be exercised to make it approximately .090 in. wide and it must be a flat surface at 45 deg. or 30 deg. depending on the design of the engine. If instead of being a flat surface, the seat is rounded,

there will only be a line contact with the valve which will result in the troubles previously mentioned. When the seat width becomes excessive it should be narrowed with a 75 deg. and a 15 deg. grinding wheel.

Naturally, to get a true seat a good pilot is necessary to guide the grinding wheel. But it should be emphasized that if the valve guide is badly worn, the valve action will be erratic and compression will suffer. It therefore pays to install new guides whenever guide wear is excessive.

In connection with refacing the valve, it pays to check the chuck frequently as it is impossible to reface a valve accurately if the chuck is worn.

A simple check on this is to reface the valve. Then loosen the chuck and rotate the valve 90 deg., tighten the chuck and reface the valve the second time. If the valve is rotating eccentrically on the second refacing it indicates that the chuck is defective and should be replaced, provided of course that the valve stem is not worn or bent. Valve and valve seat regrinding wheels should be trued with a diamond cutter frequently in order to insure a free cutting wheel. Naturally, the more seats a grinding wheel will reface without becoming grooved, the better the equipment is.

## Cam Angle Indicator

A sure way of checking distributor operation is with a cam angle indicator such as the new "Breaker Point X-Ray" developed by Electro Products Co., 621 East 216th St., New York City. It checks breaker point dwell at all speeds, indicates breaker point bounce, contact resistance, etc. The new instrument is of sturdy construction and is attractively finished. For complete information and prices, write the manufacturer.

## Atkins Improves Saws

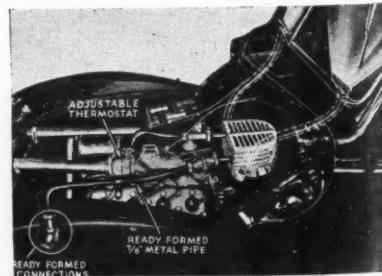
A hacksaw blade is just a hacksaw blade to most of us, but to E. C. Atkins & Co., 402 South Illinois St., Indianapolis, Ind., a hacksaw blade means the product of extensive research in steels, designs of teeth, types



of jobs, and everything that goes into making a really good hacksaw blade. Recent improvements in tooth design and set have resulted in new blades which are said to be the best ever produced by Atkins. The new blades are identified as No. 400 and No. 500.

## Arvin Heaters for 1939

End your hot water heater problems by installing the new Arvin heaters with tailor-made fittings, introduced by Noblitt-Sparks Industries, Inc., Columbus, Ind. Illustration shows in-



stallation on a Ford car, using  $\frac{3}{8}$  in. water pipes with ready-formed connections and free-flow shut-off valve. Included is a positive temperature control provided by an adjustable thermostat.

Other heaters in the line range in price from \$9.95 to \$17.95, for installation on all popular cars.



**Celebrate WITH BURD IN 1939**

**25 Years of Piston Ring Progress**

The Burd "High Compression coupler type" ring of 1914 was the first practical piston ring to solve the problem in motors of that day.

In 25 years motor speeds, compression, piston materials and clearance, ring widths, fuels and oils have been revolutionized. Now, Burd celebrates its silver anniversary by bringing you the most positive, most dependable means for oil control in modern motors—the Burd "Super Hi-Speed" oil ring, with advanced refinements for 1939.

**1939**

Piston ring requirements for improved motor performance have changed much since 1914, but there is one thing that has never changed—the Burd ideal of precision. Advancement in all factors affecting piston ring performance continues to be the dominant thought in the minds of Burd Piston Ring engineers. Precision, plus a steadfast policy

of cooperation with the motor service industry, is the reason why after twenty-five years of uninterrupted service Burd is recognized as the outstanding manufacturer of quality piston rings. We invite you to join the celebration of this, our Silver Anniversary, and build with Burd a happier, more prosperous New Year. Write for 1939 proposition.

**BURD PISTON RING COMPANY, Rockford, Illinois**  
(Associate Co., Liberty Foundries Co.)

**BURD** *Super Hi-Speed* **PISTON RINGS**

LINDBLOOM VALVE PACKING • HADEES HOT WATER CAR HEATERS

ATLANTA, GA. . . 542-544 Spring St. N.W. MINNEAPOLIS, MINN. . . . 21 S. 13th St. SAN FRANCISCO, CAL. . . 540 McAllister St.  
CHICAGO, ILL. . . . 2236 S. Wabash Ave. NEW YORK, N.Y. . . . . 549 W. 52nd St. SEATTLE, WASH. . . . . 1525 10th Ave.  
DALLAS, TEXAS . . . . 2705 Canton St. ST. LOUIS, MO. . . . . 3225 Locust Blvd. MONTREAL, Quebec, Can. . . 732 S. Antoine  
KANSAS CITY, MO. . . . 1606 McGee St. TORONTO, 5, Ont. Can. . . . 20 Hayter St.  
LOS ANGELES, CAL. . . 1500 S. Hope St. WINNIPEG, MAN. CAN. . . 126 Lombard St.



**PROFITS Roll in  
WHEN THIS SHOP Rolls Up**

## **EVERYTHING RIGHT AT YOUR ELBOW**

*Save time . . . save steps . . . with this  
U. S. VALVE REFINISHING SHOP*

*equipped with*

### **VR6 NEW REFINISHING MACHINE**

*(with 2 motors, one for driving chuck spindle,  
one for driving grinding wheel)*

### **THE SHOP INCLUDES:**

VR6 Refinishing Machine (size 1/8" to 9/16" or 1/8" to 5/8")

Cabinet with wiring and adjustable lamp

High speed driver

Valve seat stone dresser

7 45° valve seat grinding stones,  
for hard seats

2 30° valve seat grinding stones,  
for soft seats

1 20° valve seat grinding stone,  
soft

5 U. S. adjustable valve seat  
pilots

2 U. S. valve seat stone holders

2 Carbon cleaning brushes,  
1 straight, 1 flared

2 Valve guide cleaning brushes

1 Adjustable valve guide cleaner

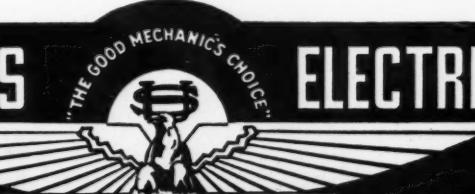


### **And here are more features:**

Full size door  
Adjustable lamp  
Valve rack  
Built-in electric plug with 25-ft. cable  
Heavy steel cabinet  
Heavy duty swivel rubber casters  
Lock in door handle  
Five large compartments  
Door holds all pilots, stones, valve guide  
cleaners, carbon cleaning brushes, grind-  
ing stone adapters, etc.

**THE UNITED STATES**

CINCINNATI,



**ELECTRICAL TOOL CO.**

OHIO, U.S.A.

## Pedrick Announces May Contest Winners

As was true also for April, 54 repairmen have won cash prizes totaling \$500.00 for cooperating in the Pedrick Car-Owner Motor-Job Contest for May. Here are the top winners:

First prize, \$100.00—Clifton J. Carlin, Carlin's Service Station, 1372 Lonsdale Ave., Saylesville, R. I.

Second prize, \$75.00—Tony Ambrosius, Tony's Garage, 341 N. Broadway, Green Bay, Wis.

Third prize, \$50.00—Theodore Fischer, Fischer Motor Company, 445 Fillmore St., San Francisco, Cal.

Fourth prize, \$25.00—L. J. Stanton, S. & S. Auto Repair Shop, 700 W. Fourth St., Anaconda, Mont.

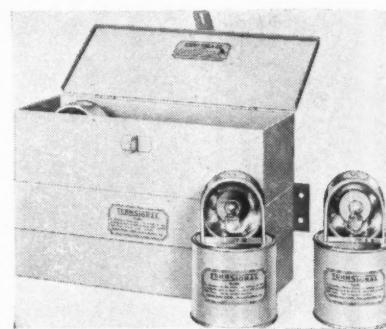
In addition to the four major prizes, fifty shop men in all parts of the United States won \$5.00 each.

This Pedrick contest repeats itself each month. Repair shops registered in the plan and cooperating with Pedrick not only participate in the opportunity to win substantial cash prizes for themselves, but get the benefit of Pedrick's offer to car owners of 100 free motor jobs each month in a separate contest which sends interested car owners into Pedrick repair shops for entry blanks. The motor jobs which are awarded by Pedrick are done by

the shop sponsoring the winner and Pedrick pays the shop in full for the job.

## Turnco Flare Has New Features

No matches needed, no corroded switches to repair when you need a flare. The new Turnco Flare made by the Turn Signal Corp., 400 East Rittenhouse St., Philadelphia, Pa., incorporates a new feature which eliminates these troubles. The lighting current is generated by four specially constructed dry cells which remain chemically inert until the flare is to be put in use. When needed,



# A one-word man



### The DOSTAM METHOD brings new balance to industry

By eliminating excessive management overhead . . . by eliminating outside processing operations that mean outside profits . . . and by rigid control of selling expense, the Dostam Method permits higher wages to direct labor . . . the highest product quality . . . and in addition, a line of prices that average 20 per cent under the prices of other well-known quality products.

In a comparatively few years, the Dostam Method has made the Crescent Company the largest independent producer of automotive wiring for the replacement field . . . and it has brought to thousands of

dealers a new conception of profits on automotive wiring products.

The Wiry Joe Line is the most complete and profitable quality line you can handle. Don't let profits like these get away from you.

This advertisement is appearing in all leading trade publications this month.



strike the blister on the bottom of the signal sufficiently hard to dent it. This starts the chemical action and the dry cells then generate an electric current ample for a full light intensity for from 14 to 16 hours. Thereafter the light will gradually diminish in intensity until the chemical action ceases. This requires a total of 24 to 30 hours.

Turnco flares are supplied in single units at \$1.75, or packed 3 to a metal container for \$6.75 including the cost of the container.

## Radio Profits

(Continued from page 17)

menu, thereby doubling the sale in many an instance. In both cases, a loan set while the owner's radio is being repaired is a feature which is much appreciated.

5. A 16-point "check-up service," inclusive for \$1.50, prompts radio owners to take a stitch in time, without waiting until the radio refuses to play. Also, the point is made that a lack of preventative service, such as the \$1.50 check-up, may cause all kinds of reception trouble. Here are the sixteen points featured in a Central check-up:

1. Remove corrosion from aerial and ground connections
2. Tighten aerial and ground connections
3. Inspect for all loose connections
4. Test tubes and attach labels showing condition
5. Check tube sockets for poor connections
6. Tighten tube shields
7. Inspect loud speaker for rattles
8. Clean exposed volume control
9. Check volume control for noisy operation or dead spots
10. Tighten dial knobs
11. Check operation of set over frequency range
12. Clean chassis
13. Check pilot light
14. Check wiring for fraying which might cause short circuits
15. Test battery strength in battery operated sets
16. Clean and lubricate tuning mechanism

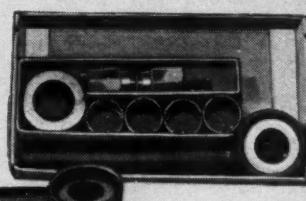
HYDRAULIC  
BRAKE FRONT  
WHEEL CYLINDER  
REPAIR KIT



HYDRAULIC  
BRAKE REAR  
WHEEL CYLINDER  
REPAIR KIT



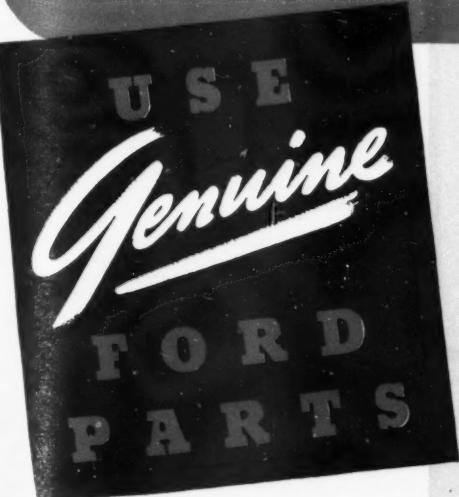
SPINDLE BOLT  
AND  
BUSHING KIT



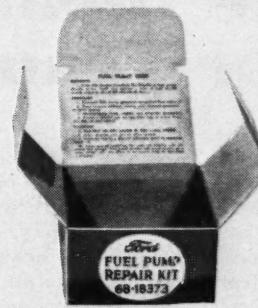
SPINDLE BOLT AND BUSHING KIT

THESE CONVENIENT  
**FORD PARTS KITS**  
Save you money and trouble  
Help you sell a job

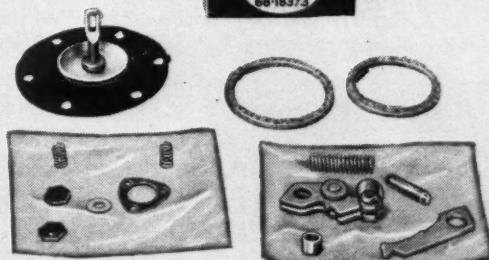
These kits include all the essential parts usually required for reconditioning. In most cases the parts in a kit cost you less than if you buy them separately. They are easier to handle and to store when in the convenient-sized box. And they're a help in showing the customer just what parts are necessary for the reconditioning job. See your nearest Ford Parts Distributor and stock up on these handy kits.



BULB AND FUSE KIT



FUEL PUMP  
REPAIR KIT  
68-18373



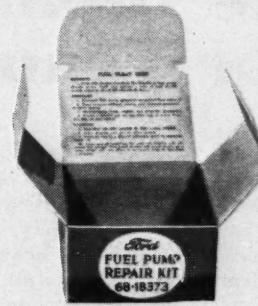
FUEL PUMP KIT



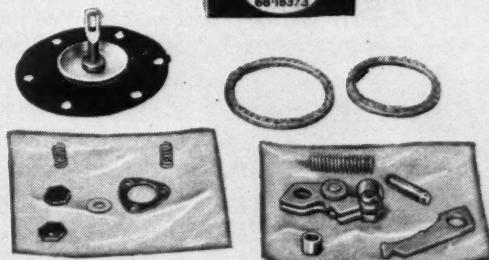
RADIATOR FLUSHING AND CLEANING KIT



HYDRAULIC BRAKE  
MASTER CYLINDER  
KIT



FUEL PUMP  
REPAIR KIT  
68-18373



FUEL PUMP KIT

## Midnight Oil

(Continued from page 13)

rewiring manual issued by the Packard Electric division of General Motors. H. C. Dinty Mohr and R. J. Montgomery were the originators of this manual, which, in addition to giving the fundamentals of electrical circuits, gives detailed instructions on testing and electrical trouble shooting. Furthermore, the Packard Electric division gives a certificate to the mechanic who correctly answers the list of questions given in the back of the manual. The certificate states that the holder has passed the examination and has

been provided with all the necessary data to render certified rewiring service. Such a certificate hanging above the work bench or some other place where it is readily seen by the customer, will tend to increase customer confidence and business.

Already over 5000 mechanics have received such certificates. In other words, 5000 mechanics have improved their knowledge of electrical trouble shooting, wiring and circuits, with the result that they will give better service and increase their business and profits. That these manuals are appreciated and valued is shown by the fact that 3000 copies have been secured by the Oakland California

schools for the use of their automotive students.

In connection with electrical work it should be pointed out that it is really a safety service as good wiring reduces the hazards of fire. A survey made in the city of Columbus disclosed that 116 automotive fires out of 425 were caused by defective electrical wiring.

As previously mentioned there are many other parts and equipment companies that have manuals giving instructions on trouble shooting and the use of their products. Every mechanic and shop owner should take advantage of such opportunities, particularly those who wish to increase their income.

## Tests Valve Leaks

Air leaks through the valves are easily located with the Lectro Valv-O-Meter made by Black & Decker Mfg. Co., Towson, Md. Instrument is actuated electrically, and is highly sensitive to any slight variation in air pressure. Operation consists of inserting whistle compression signal in spark plug hole and turning engine over until signal indicates piston coming up on compression. Then air pressure control valve is connected to air line and inserted in spark plug hole,



## The Ideal Snap Ring for Transmissions!

Every time a transmission comes in for bearing replacements, you can be sure of a good job when you use McGILL Snap Ring Bearings. You can be sure of turning the jobs out in good time, too. McGILL Snap Ring Bearings are made of finest high carbon alloy steel, made accurately, and run quietly and with least friction because they have bronze retainers. Every McGILL Snap Ring Bearing comes absolutely free from injurious foreign matter, properly greased, wrapped in oiled paper, individually boxed and plainly marked for size. Order from your jobber's stock.

"Use McGILL—the Bearings with Bronze Retainers"

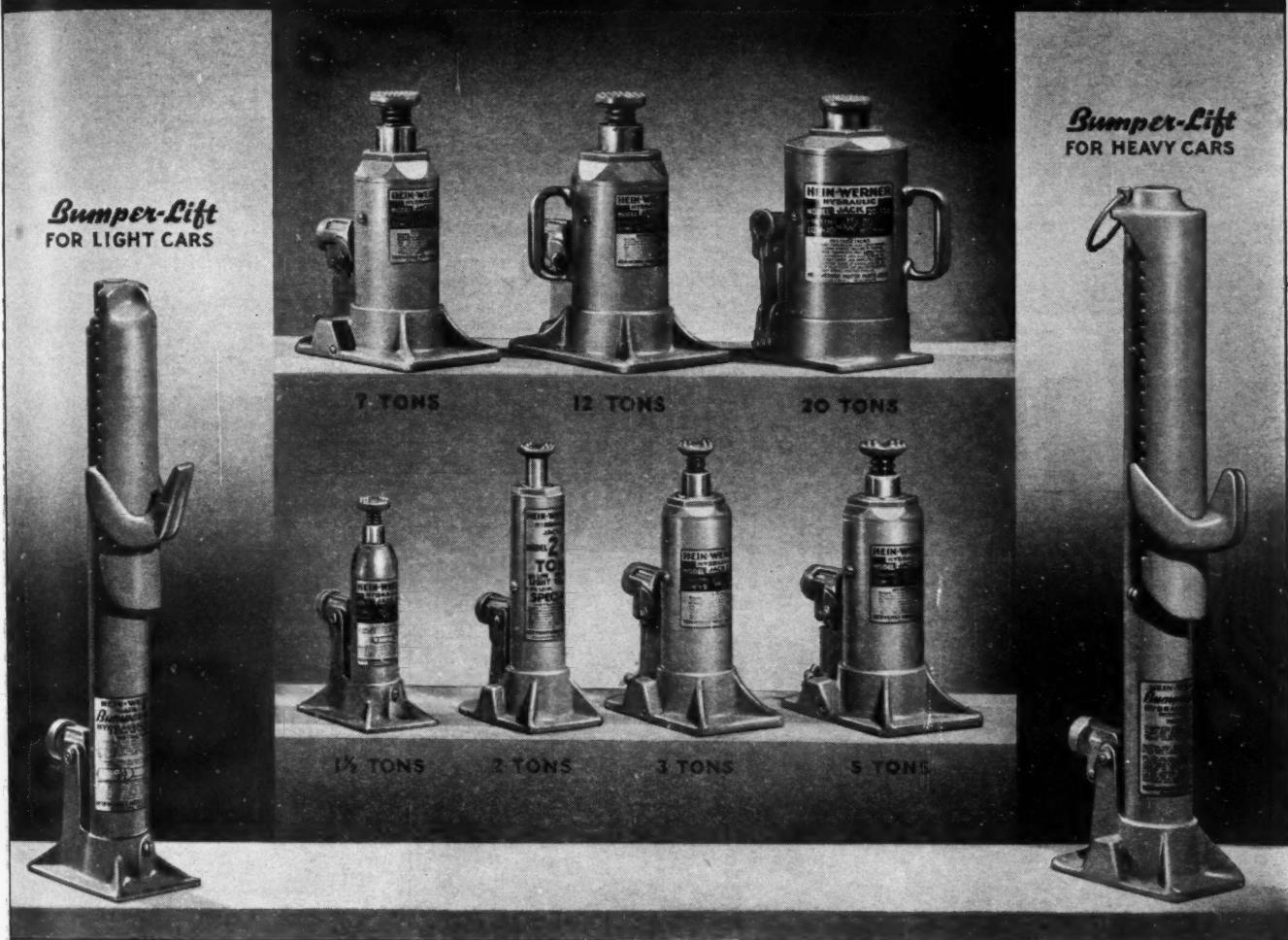
**McGILL MANUFACTURING COMPANY**  
Bearing Division—1600 North Lafayette Street  
VALPARAISO, INDIANA



building up air pressure in the combustion chamber. With Valv-O-Meter electrical connections attached to live terminal and ground, insert the air line adapter into each of the remaining spark plug holes. Any leakage of air around the valves in the cylinder under compression will travel through the manifold and into an open cylinder. This leakage will be registered on the Valv-O-Meter. List price \$39.50.



# ALL H-W JACKS are BUILT RIGHT and PRICED RIGHT



New HEIN-WERNER  
**O'BOY**  
 Hydraulic  
 TIRE SERVICE JACK  
 ONLY

**\$17 45**  
 NET TO DEALER  
 (West Coast \$18.45)



O'BOY has 2,500 lb. capacity . . . Has quick removable two-piece handle . . . Positive release valve . . . 4" diameter wheels . . . Raises to 17 1/2" — high enough to change the tire on any passenger car, as well as on many light trucks . . . Has sparkling WHITE SADDLE which makes it easy to spot under load. This Model "O" is a leader in "THE WHITE SADDLE LINE."

Easy operating **HEIN-WERNER**  
**HYDRAULIC JACKS** actually cost  
 you **LESS** than some shop owners  
 have paid for mechanical jacks . . .

Now that Hein-Werner Hydraulic Jacks are priced so low — and since they operate so easily — and are so dependable — you should have several in your shop . . . You'll also find it worth your while to stock and sell H-W Hydraulic Hand Jacks for passenger cars and trucks . . . All these models are built right and priced right.

Before leaving the factory, all Hein-Werner Hand Jacks are tested at 1 1/2 times their rated capacity. These jacks are compact, powerful and **SAFE**.

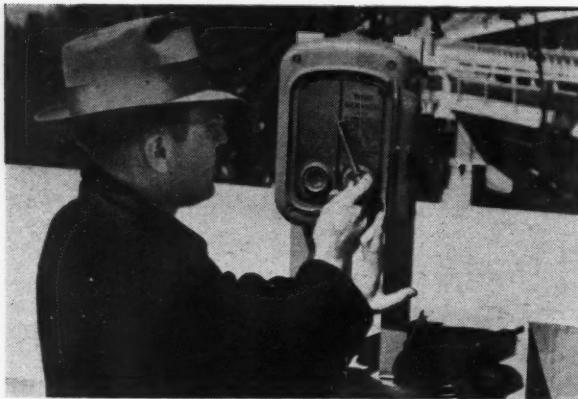
Complete line includes the "Bumper-Lift" and the "Bullet" 1 1/2 ton capacity jacks for passenger cars . . . Also 2 ton "Light Truck Special," 3, 5 and 7 ton capacity jacks for trucks, and 12 and 20 ton jacks for trucks and buses . . . And a complete line of **SERVICE JACKS** — 1 1/2, 2, 3 and 4 ton capacity.

Ask your jobber or write us for 1939 prices and details on complete line.

**HEIN-WERNER MOTOR PARTS CORP., Waukesha, Wisconsin**

FEW MODELS ENGINEERED TO DO THE WORK OF MANY

**HEIN-WERNER**  
*hydraulic* **JACKS**



#### AID

Boon to motorists are these emergency call boxes on the San Francisco - Oakland Bay Bridge. Comes motor failure or a flat tire, the motorist breaks the glass in one of these boxes, sounding an alarm which brings a tow car from the end of the bridge.

# TUMBLER

NOW IN  
25¢  
PACKAGES

#### TUMBLER BRILLIANT POLISH

This nationally advertised, nationally known polish is now available in a generous 25c size . . . enough for two to three car polishes. Tumbler Brilliant Polish restores new car lustre and retards finish oxidation. It's the easiest to use and fastest polish for the man who shines his own bus.

#### TUMBLER SPEEDY CAR WASH

The most amazing car washing material ever developed. Not a soap . . . contains no alkalies or abrasives. Just add Tumbler Speedy Car Wash to the water. It cuts washing time to a fraction, and the car dries without spots or stains without even wiping. Just wash the car . . . rinse it off . . . let it dry. Sells like hot cakes in this 25c size. Enough in each can for 3 washings.

ASK YOUR JOBBER'S SALESMAN . . .  
OR WRITE, WIRE OR PHONE

**J. A. TUMBLER LABORATORIES**  
BALTIMORE, MARYLAND

#### Performance Indicator

Keep your eye on gasoline consumption with the new Gasmaster, made by the Speedometer Service Co., Inc., 281 Central Ave., Newark, N. J. It is a vacuum gage with a special dial to indicate the efficiency of performance with respect to gasoline consumption. Can be mounted on any car and placed where the driver can observe the reading at all times. For complete information and prices, write the manufacturer.

#### Caster-Camber Gage

Checking caster and camber is easy with the new No. 373 Duby gage developed by John F. Duby Co., 744 Gallivan Blvd., Dorchester, Mass.



Made of aluminum for easy handling, one end checks caster and the other end checks camber. Write the manufacturer for complete information.

#### King Has New Tester

Complete with electric tachometer and exhaust gas analyzer, the new "King" MT-700 motor tester represents the last word in motor testing equipment. Except for the two instru-



ments mentioned, the new model is the same as the "King" MT-250 tester, and will make all motor and ignition tests quickly and accurately. Price \$350.00 complete. For complete information write Electric Heat Control Co., 9123 Inman Ave., Cleveland.

# THE WHOLE INDUSTRY IS TALKING

*about*  
KING QUALITY  
ALGINIZED  
Engineered Set  
PISTON RINGS

*...because*

## HERE AT LAST IS A SURE WAY TO GREATER PISTON RING PROFITS

*Remember -*



a steel ring alone will not do the job. • It takes King Quality Engineered Sets with properly engineered rings for each of the other grooves to work with the steel ring.



**KING QUALITY PRODUCTS CO.**  
ST. LOUIS, MO.



As we go to press it appears that the factories' output of cars and trucks for the month of June will number about 250,000 units. This would be a little more than 30 per cent better than the production in June, 1938—and will eventually mean just that much more potential business for your shop.

\* \* \*

Now you can buy your cars over the counter. The newest comer to the car manufacturing field, Crosley Corp., is selling its low-priced cars in department stores. The small cars are being sold at Macy's in New York, Bamberger's in Newark and Gimbel's in Philadelphia; by the time this issue reaches you they may be appearing in other stores throughout the country. At present financing arrangements may be made at the stores, although trade-ins are not being considered.

\* \* \*

Cadillac is pointing with pride to the performance of one of its sixteen cylinder engines. The engine was used by a mining company in moving a 140-ton dragline in Jasonville, Ind.

Being scoffed at from all directions, the mining company merely rented the engine for the job—but purchased it outright when its performance proved it could handle such a task well.

\* \* \*

The Automobile Manufacturers Association tells us that eight out of every ten car buyers this year prefer sedans. Fifty-six of every hundred sedan buyers purchase the four-door type, while 46 choose the two-door. Coupes, however, appear to be steadily gaining in popularity.

\* \* \*

F. S. Bennett of London, a recent visitor to the Cadillac-LaSalle plant, tells an interesting story of an incident occurring in England in 1903. Europeans at that time appeared to be skeptical of this country's ability to build good automobiles. Mr. Bennett arranged to dismantle three stock Cadillacs of that period, scramble the parts and then reassemble the cars. As an added handicap he added a number of parts from his stockroom.

To the amazement of observers the cars performed perfectly after the assembly with different parts. This

"parts interchangeability test" won for Cadillac the first of two Dewar trophies, awarded annually by the Royal Automobile Club for an outstanding motor achievement. The honor, coupled with wide publicity on the test itself, boomed sales of American cars abroad and contributed much to the prestige they still enjoy.

\* \* \*

All of the activity at the Chevrolet plant these days isn't focussed on turning out new cars—some of it is being concentrated on preparations for Chevrolet's annual Soap Box Derby. Finals this year are set for Aug. 13 at Akron, Ohio. If you're

(Continued on page 68)

## Bendix Battery Tester

The Bendix Radio Corp., General Motors Bldg., Detroit, Mich., has announced a new battery analyzer, which, it is claimed, will make a test of the battery and indicate trouble in 5 sec. In addition to showing the condition of the battery, the tester also indicates the charging rate required to carry the load, and the drain placed on the battery by accessory units. Complete information regarding this new battery analyzer will be supplied by the manufacturer.

## Van Dorn Redesigns Tools

Seven units in the Van Dorn line have been redesigned for less weight, more compactness and greater durability. Particular attention has been paid to the new  $\frac{1}{2}$  in. Utility Drill

**Glass!** HANDLE WITH CARE

A hurricane strikes and a city of plate glass windows crash. Into the stricken area go huge trucks carrying now, 18-foot plate glass windows. These fragile loads call for the world's finest brakes. And those glass haulers' who know best depend on Grey-Rock brake linings for smooth, safe balanced stops.

**Stop.. Roll.. Stop.. Roll.. from Dusk to Dawn**

OVERNIGHT DELIVERY!

Loaded with merchandise, fleets of heavy-duty trucks roar into cities at dusk. Tangled with the city traffic, they make hundreds of quick stops to complete dozens of deliveries. These trucks must have good brakes. To many contract haulers\* good brakes mean but one thing—Grey-Rock brake linings for safe, balanced stops. You, too, can enjoy Quick, Quiet, Smooth Stops and Longer Brake Lining Wear. Names on request.

MAKE YOUR CAR JUST AS SAFE WITH

**Grey-Rock**

BRAKES BALANCED

BALANCED BRAKE LININGS

U. S. Asbestos Division of Raybestos-Manhattan, Inc., Manheim, Pa.

LOOK FOR THIS SIGN OF FIRST CLASS SERVICE STATIONS

**Fire!**

Next Stop Chicago

IN BETWEEN!

as you do, in spite of passenger loads. With better safety records rely on Grey-Rock to make giant with perfect balance and safety. Quiet, Smooth Stops and Longer Names on request.

**JUST AS SAFE WITH**

**Rock**

BRAKE LININGS

U. S. Asbestos Division of Raybestos-Manhattan, Inc., Manheim, Pa.

FIRST CLASS SERVICE STATIONS

**u-Rock**

BRAKE LININGS

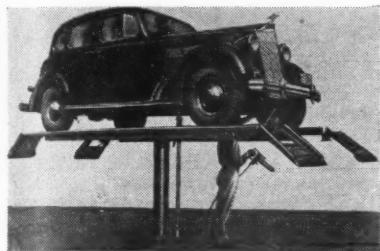
U. S. Asbestos Division of Raybestos-Manhattan, Inc., Manheim, Pa.

LOOK FOR THIS SIGN OF FIRST CLASS SERVICE STATIONS

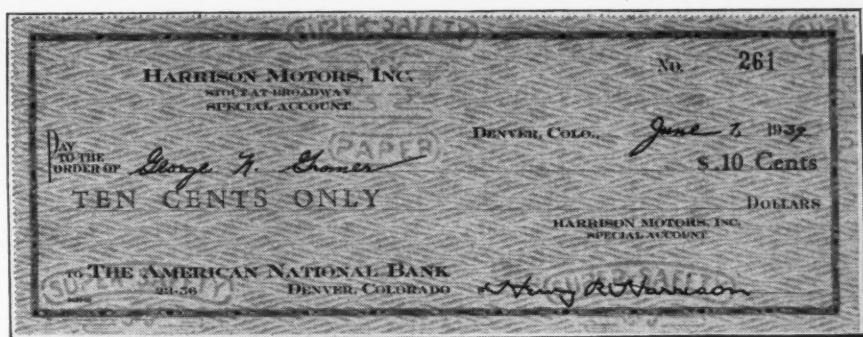
which is a full  $3\frac{1}{8}$  in. shorter than the previous model and is 3 pounds lighter in weight. The other redesigned units are the  $\frac{5}{8}$  in. heavy duty,  $\frac{3}{8}$  in. Utility,  $5/16$  in. heavy duty and  $\frac{1}{4}$  in. heavy duty electric drills. In addition there are two newly designed drill stands. The Van Dorn Electric Tool Co., Towson, Md.

### Globe Rock-A-Car Jack

You'll do a better lubrication job with a Globe Rock-A-Car jack, because it moves the car up and down a distance of two inches while you lubricate. This breaks the old grease seal and permits the new grease to penetrate with less effort, and work



in to points not ordinarily lubricated when the car is quiet. The jack has a long shaft so it can be used from the floor while the car is on the lift. It can be regulated to give from 5 to 25 movements per minute, duplicating the movement of the car on the road. For complete details write the Globe Hoist Co., 205 West Court Ave., Des Moines, Iowa.



A good check and a good idea for business (see story below)

### A Check for Their Time

Harrison Motors, Inc., Denver, Colo., believes in direct mail for boosting business. To make sure its direct mail letters are read, a ten cent check is enclosed to catch the readers' attention. The check is good, but we doubt if many of the recipients attempt to cash it—if they did, it would make Harrison's direct mail pretty expensive. However, the check serves the purpose and calls attention to the sales story Mr. Harrison includes in the letter, which follows:

Dear Mr. Smith:

\$17,500.00 A YEAR!

That's the value we are placing upon your time. The 10¢ check is to compensate you for the one minute it takes to read our message. It is at the rate of \$6.00 an hour or \$48.00 an 8-hr. day.

When you figure it that way it assumes real importance, doesn't it?

You have a car in which you have invested several hundreds of dollars. Therefore the purchase price is a matter of importance to you. Yet, neglect of proper servicing as you go along digs into that original figure at an alarming rate.

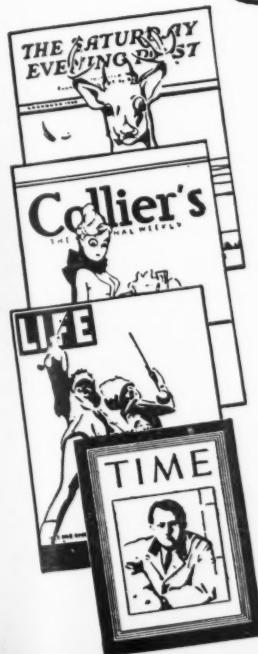
Here we are at the beginning of summer. Unless you are most unusual in the care of your car it needs servicing or tune up. Why jeopardize ANY part of your original investment for the small amount of money it costs to protect it?

Be assured that a shop such as ours will serve your BEST interests. That's why we send the check and thank you for your indulgence.

Very sincerely,

Harrison Motors, Inc.  
by Henry R. Harrison

## S: MAKE YOUR CAR JUST AS SAFE . . .



Motorists envy the stopping power of the big truck and bus fleets which have standardized on Grey-Rock. That's why we tell them, week after week and month after month in SAT. EVE. POST, COLLIER'S, LIFE and TIME, that they can make their cars just as safe with Grey-Rock Balanced Braksets.

Grey-Rock ads will again reach millions of prospects in July. Grey-Rock dealers will install **more** Balanced Braksets and sell **more** profitable brake service jobs than ever before.

Display your dealer sign. Be a Grey-Rock dealer. Profit with the condensed line of Balanced Braksets. Rely on Grey-Rock's Dealer Sales Helps and authoritative Technical Information Service.



# Grey-Rock BALANCED BRAKSETS

UNITED STATES ASBESTOS DIVISION of Raybestos-Manhattan, Inc., MANHEIM, PA.  
BRAKE LININGS • CLUTCH FACINGS • FAN BELTS • HOSE • PACKINGS • RELINING EQUIPMENT

## AAA Race Schedule

A national championship classic and "full throttle" for the county and state Fair season highlights the automobile racing schedule for July and August.

The Fair season, when the speed kings hit the most strenuous schedule of the year, opens July 29 at the Delaware State Fair, Harrington. The Harrington air has opened the Fair season of automobile races for many years.

The next national championship classic will not come until August at the Wisconsin State Fair, Milwaukee.

The date for the 100-mile title event is August 27.

The second in the series of three race programs preliminary to the title event at Milwaukee will be run there on August 20. The final preliminary program will be run August 24.

Following is the complete July and August schedule released by the AAA Contest Board:

July 4	250 Mile All American Stock car race, Langhorne Speedway, Philadelphia, Pa.
July 16	Williams Grove (Pa.) Speedway
July 23	Lebanon (Pa.) Speedway
July 29	Delaware State Fair, Harrington
July 30	Williams Grove (Pa.) Speedway

Aug. 5	Mifflin county Fair, Lewistown, Pa.
Aug. 13	Williams Grove (Pa.) Speedway
Aug. 19	Afton (N. Y.) Fair
Aug. 19	Middletown (N. Y.) Fair
Aug. 19	Illinois State Fair, Springfield
Aug. 20	Lebanon (Pa.) Speedway
Aug. 20	Wisconsin State Fair, Milwaukee
Aug. 24	Wisconsin State Fair, Milwaukee
Aug. 26	Hamburg (N. Y.) Fair
Aug. 26	Bedford (Pa.) Fair
Aug. 26	Altamont (N. Y.) Fair
Aug. 27	Williams Grove (Pa.) Speedway
Aug. 27	100 Mile National Championship race, Wisconsin State Fair, Milwaukee

Note: All events are sprint programs unless otherwise designated.

It's sharpening the tally pencil to its sharpest point to count Shaw out of the title running, but arithmetic gives the second and third place winners an encouraging chance to wear the crown—and these same figures have counted twelve Indianapolis winners out of the National Championship since the first International Sweepstakes was run in 1911.

In the first six years of the Indianapolis classic, the Hoosier winners did not become the National champion. It was not until 1916, when Dario Resta piled up additional points in other campaigns that an Indianapolis winner was crowned king of the sport.

The last Indianapolis winner to be counted out of the crown for the year was Lou Meyer who lost his edge of 1936 to Mauri Rose, second place winner at Indianapolis, in the final tally.

Here are the official points from this year's Indianapolis race as counted by the American Automobile Association's Contest Board for MOTOR AGE:

Driver	Points
Wilbur Shaw	1,000
Jimmy Snyder	825
Cliff Bergere	675
Ted Horn	550
Babe Stapp	450
George Barringer	375
Joe Thorne	325
Mauri Rose	275
Frank Wearne	225
Billy Devore	136.5
Tony Gulotta	114.375
Louis Meyer	75

Note: The fractions in the point listing indicate that the driver used a relief driver.

## Now You Can Play Songs on Your Horn

The Sparks-Withington Company has recently announced two new horns in its Music-Aire Series, supplementing its other types of musical horns, the Sparton Repeater and Sparton Bugle.

First of these new items is the Californian, which repeats the opening bars of "California, Here I Come." The other is the New Yorker, which sounds a musical phrase of the song, "Sidewalks of New York." The New Yorker horn has been widely publicized because of its use on all Greyhound lounge-car motor trains at the New York World's Fair. "Boys and Girls Together" as an auto warning signal has been extensively reported in metropolitan newspapers and on a number of radio broadcasts in recent weeks.

## Make Your Dollars Do Heavy Duty, Too!

• Ajax sets the pace in jack values—with a proper jack for every purse—a full range of heavy duty hydraulics from 2 to 12 tons and mechanicals from 3 to 6 tons for truck and bus service. Built to stand abuse—priced to bring a smile . . . and backed by a name known for its quality. Ask about the "buys" your Ajax jobber has to offer you.

AJAX AUTO PARTS COMPANY • RACINE, WISCONSIN

A JACK FOR EVERY AUTOMOTIVE NEED

A STEADY Sales INCREASE



## BUILT BY THE DEMAND FOR TOLEDO

In 1938, Toledo had a substantial sales gain. In the last three years a sales increase of 118%. It's the fastest-growing replacement parts line.

In 1939 Toledo sales are 45% ahead of 1938.

This sales increase is the result of the demand of garagemen everywhere for the high quality and top performance that are built into every Toledo replacement part.

Get out in front with Toledo. Standardize 100% on the Toledo replacement parts line. Order now and always order Toledo by name.

**THE TOLEDO LINE IS COMPLETE**  
Valves and Valve Parts  
Pistons: Aluminum, Cast Iron  
Piston Pins—Chrome-Plated  
Cylinder Sleeves  
Cylinder Sleeve Assemblies  
Engine Bearings Water Pumps  
Water Pump Parts  
Tie Rod Ends  
Chassis Bolts and Bushings  
Shackles: Tryon, Silent "U"  
Knee Action Parts

**THE TOLEDO STEEL PRODUCTS COMPANY, TOLEDO, OHIO, U. S. A.**

Warehouses: Atlanta . Boston . Chicago . Cincinnati . Cleveland . Dallas . Detroit . Jacksonville . Kansas City . Memphis  
Minneapolis . New York . Philadelphia . Pittsburgh . St. Louis . Wichita . Los Angeles . San Francisco . Portland . Seattle

*Look for the Name*  
**TOLEDO**

## Diesel Injector

(Continued from page 15)

If the injector does not pass the tests it must be dis-assembled, the trouble corrected and then re-assembled.

### Dis-assembly and re-assembly:

To dis-assemble:

1. Place injector in injector vise (GM No. J-1261) in inverted position. Using seat nut wrench (GM No. 1238) unscrew but do not remove seat nut.

2. Remove injector from holding vise and hold it just over No. 1 clean-

ing pan filled with clean fuel oil. Remove seat nut and place all parts in cleaning pan. If spray tip does not free itself from the seat nut, it can be removed with seat driver (GM No. T1032).

3. Place injector in holding vise in right side up position and using screw driver (or GM No. 7647) pry follower spring out of the way and remove stop pin. As pin is withdrawn hold left hand over follower spring to prevent plunger and bushing assembly from springing outward. Place parts in No. 1 cleaning pan. Jar the rack pinion from injector body and withdraw the rack.

4. With injector in upright posi-

tion in vise remove fuel connections making sure that filter springs do not spring outward. Place connections, filters and springs in No. 1 cleaning pan.

5. Brush all parts thoroughly making liberal use of cleaning fluid from No. 1 pan. Blow parts dry with filtered air. Repeat process several times. This is important.

6. Check plunger and bushing through magnifying glass for any trace of mechanical damage. If there is any these parts must be discarded. Since the plunger and bushing are lapped together they are not replaced separately. If there is no mechanical damage place these parts in No. 2 cleaning pan full of clean fuel oil or carbon tetrachloride and rinse thoroughly. Dry with filtered air and wipe thoroughly with toilet tissue. (Do not use rag.) Bearing surface of bushing can be dried by wrapping toilet tissue around tool (GM No. 1021), a simple cylinder of the correct diameter with a longitudinal slit from which to start and hold the tissue. Work tool in and out and rotate. Insert plunger in bushing making sure that fingers do not touch bearing surface as moisture or dirt left by fingers may cause plunger to stick. With bushing on bearing surface of plunger, spin bushing with fingers. It should spin freely. At least as free as a small, clean, well-oiled ball bearing. If it does not, start in and clean and blow, clean and blow until it does.

7. After carbon and discoloration have been removed from spray tip by immersion in cleaning pan No. 1 and brushing with an extra fine wire brush, hold in under magnifying glass and punch out the six spray holes with tool (GM No. KMO-235), which is a handle for holding a length of .006 in. music wire. Rotate the wire in the orifice. When using a new length of wire it may be necessary to stone the end of it to remove burrs caused by cutting. After long service it might be well to test orifices with .007 in. wire. If wire enters holes the tip must be discarded but indications are that this will happen only after enormous mileages.

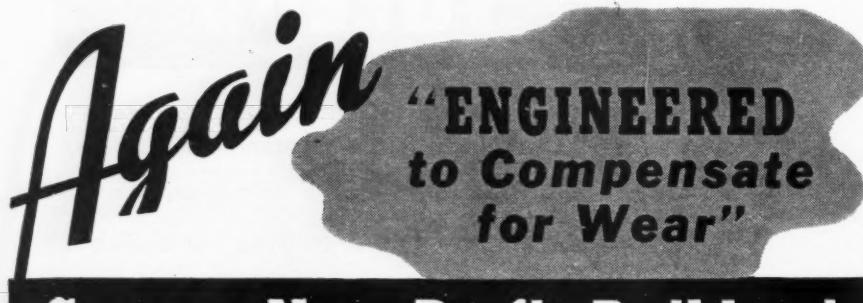
8. Using tool (GM No. J-1243) ream out inside of spray tip to remove accumulated foreign matter. Wash out in No. 1 cleaning pan and blow dry before rinsing in No. 2 cleaning pan.

9. After cleaning and blowing check valve-check seats for any discoloration. If discolored, polish on lapping block, using a figure eight motion. Lap only for discoloration and do as little of it as possible. If there is mechanical damage to these parts a matched set of spacer, flat valve, double-check valve seat and spherical valve must be used in replacement.

10. Before reassembly make sure that all parts placed in No. 1 cleaning pan have been thoroughly cleaned and blown dry, then rinsed in No. 2 cleaning pan and blown dry and finally wiped with tissue. In cleaning filters be sure to blow the air from the inside out. Replace neoprene seat nut gaskets.

11. To reassemble place injector body in holding vise in inverted position. Oil all parts as assembled with light oil.

12. Insert rack in injector body



### "Guaranteed" Headlight Relays

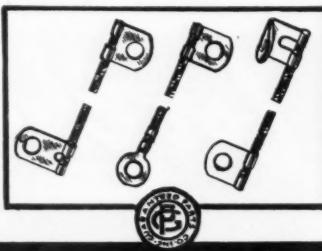
Again "Guaranteed" marches forward in its pioneer work of re-designing all ignition replacements for plus-value service. Now it's Headlight Relays—"engineered to compensate for wear"!

They are insurance against accidents—most frequent in night driving—by acting as a step-up and developing greater candle power. They compensate for the resistance of the wires and switches—compensate for the wear that occurs in reflectors and wire assemblies.

And again "Guaranteed" provides sure-fire selling help—a big, powerful display, free with your order for 4 "Guaranteed" Headlight Relays! Ask for No. LR-100.

### "Guaranteed" Connector and Ground Leads

Greatest cause of trouble in ignition systems is broken distributor lead wires. "Guaranteed" completes its line with a full range of "engineered" Connector and Ground Leads to fit Auto-Lite and Delco-Remy distributors—re-designed to compensate for wear: extra sturdy, durable, dependable! Specify "Guaranteed", and write for profit-details on the "modernized ignition".



**GUARANTEED PARTS CO., Inc. • Seneca Falls, N.Y.**

ORIGINATORS OF THE WELL-KNOWN "FOUR STAR" LINE

with yoke toward the side of the injector on which dowel pin is located. Note that teeth Nos. 5 and 6 on the rack are punch marked. Center these teeth in body of injector so that tooth No. 3 on the pinion, which is also marked, can be dropped into mating position with them. Install spacer.

13. Place bushing on body with bushing pin in slot of body. Place flat check-valve seat on bushing and then place flat check-valve on seat, covering it with spherical check-valve seat making sure that flat check-valve fits into recess. Insert spherical check-valve in check-valve spring and insert check-valve stop in other end of spring. Add assembly placing spherical valve on its seat and hold check-valve assembly in place by placing spray-valve tip over it and holding with finger.

14. Take tool (GM No. KMO-235) and place end on spray tip to hold it in position while spill deflector is dropped into position. Then place seat nut over tool and gently line up parts. When in proper position, oil threads. Seat nut should screw down by hand until the gasket seats. Tighten seat nut not to exceed  $\frac{1}{2}$  turn with wrench.

15. Place injector in holding vise in right side up position. Install fuel filters in place with holes downward. Install springs and fuel line connectors making sure that threads are oiled and that new copper gaskets are in place on connectors. Unless injector is to be used immediately screw acorn nuts on connectors to prevent dirt from entering. Threads on nuts must be oiled. All threads on injector should be oiled before installation of mating part to prevent shearing off particles of metal which would get into the injector.

16. Assemble plunger through follower guide and install follower and lock pin. Slide follower spring in place and no matter how careful you have been again wipe bearing surface of plunger with clean tissue.

17. Note timing flat on pinion and insert plunger so that flat on plunger will mate and a gentle downward pressure will place plunger in proper position. Make sure that slot in plunger follower guide is lined up with hole in injector body so that stop pin can be installed. Install stop pin.

18. Check the injector on the testing equipment as previously outlined.

General Motors' recommendation at this writing is not to dis-assemble injectors unless there is some indication that something is wrong with them. They do not advise disassembly for inspection. Test injectors at inspection periods but do not disassemble unless test shows some fault.

### Carburetor Cleaner

For cleaning carburetors, fuel pumps and distributors Carleton Products Co. recommends its KI-SOL No. 3. This liquid solvent, used cold, works perfectly in all temperatures and climates. It is a light-bodied solvent and remains so under conditions of use. It evaporates no faster than water.

KI-SOL No. 3 loosens and removes carbon deposits; it cleans quickly in from 10 to 20 minutes. This solvent has no objectionable odor and does not thicken with repeated use or lose its cleaning effectiveness. Price per gallon ranges from \$2.25 for a single gal-

lon to \$1.70 on 55 gallon orders, with money refunded if the user is not satisfied.

For further information see your jobber or write directly to Carleton Products Co., 308 N. Sixth St., St. Louis, Mo.

### Sludge Remover

If you want to keep your crankcase free of sludge, you'll find the new Magnus Met-affin will do the trick. It is a product of the Magnus Chemical Co., Inc., Garwood, N. J., and is said to remove and absorb sludge and carbon deposits, and prevent its reforming.

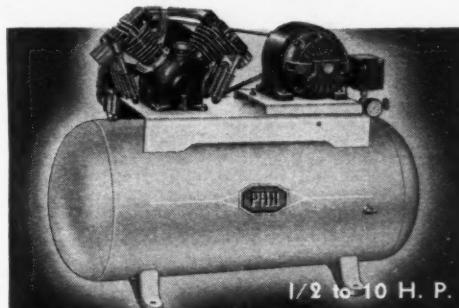
### Washes Cars Quickly

Cutting down on the time required to wash a car is an important factor in figuring costs, and the new "Super Auto Wash" introduced by E. B. Snyder, 2137 E. Harold St., Philadelphia, Pa., is said to reduce the time to less than 15 min. One ounce of Super Auto Wash is added to a 12 qt. pail of hot or cold water, applied to the car with a sponge and then washed off with a hose. No drying is necessary, as the car will dry by itself without chamoising or wiping, and will not streak, according to the manufacturer. Samples and literature will be supplied upon request.

## Where Space Is At A PREMIUM



For your convenience, and for economy of space, PAR Air Compressors are available in vertical models—packing into very small floor space all the power and efficiency of PAR horizontal units.



### PUT IT UP TO PAR!

What is your problem? Extra air . . . source of power . . . operating economy? Put it up to PAR—Solve your problem with this modern equipment that is sturdy, efficient and economical!

### GET THE NEW PAR CATALOG

There is interesting and worthwhile information for users of air compressing equipment in the big, new PAR Catalog. Your copy is waiting—write today!

MODERN EQUIPMENT CORP., DEFIANCE, OHIO

## Merchandising Aids

(Continued from page 30)

sonalized advertising by mail which combines interest-creating effectiveness with exceptionally low cost to the service man.

The entire business building program is furnished free with a small assortment of brake lining.

What safety motor vehicle inspections really accomplish in the way of accident prevention is shown pictorially in a new booklet issued by the Weaver Mfg. Co., Springfield, Ill. De-

fective wiring, broken bearings, worn spindles and bolts, broken U bolts, defective brakes and many other items are pictured just as discovered during inspections. Pictured also are safety lane inspection stations operated by the several states.

This booklet vividly portrays the good that is accomplished by compulsory inspections, and should provide a convincing piece of evidence for those states which are contemplating instituting motor vehicle inspection laws.

A new catalog by the U. S. Air Compressor Co., 5300 Harvard Ave., Cleveland, Ohio, tells the story of the

complete line of lubricators and lubricating equipment produced by that company.



One of the many sales and merchandising helps supplied by Zecol, Inc., Milwaukee, Wis. This display, in attractive colors, is promoting sales.

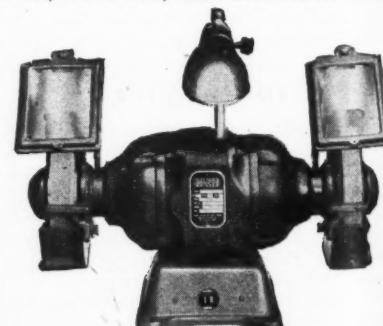
The Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill., is offering a new type of dash control merchandiser which displays 12 controls of 4 different types. When a sale is



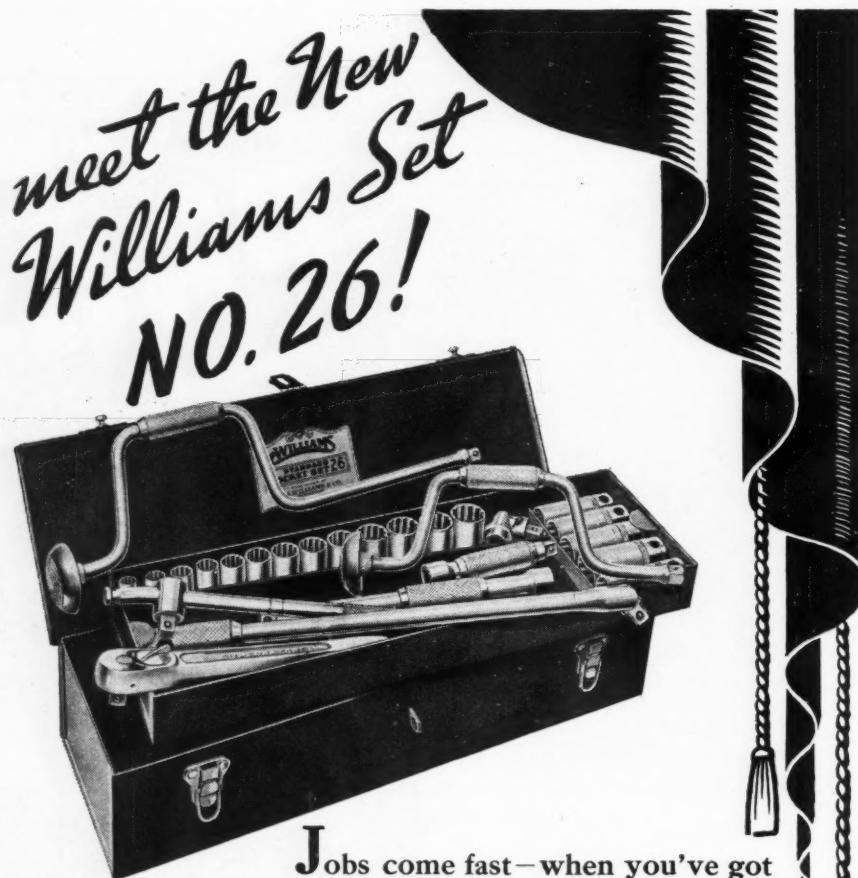
made all that is necessary is to lift up the top of the display, remove the control and tuck the knob-portion in the carton, and it is ready for the customer.

### Baldor Grinder

A shatter-proof eye shield over each wheel, and an adjustable machine tool light which may be swung over either wheel are the outstanding features of the new bench grinder introduced by The Baldor Electric Co., 4357 Duncan Ave., St. Louis, Mo. Known as Model



No. 714, the new grinder is powered with a  $\frac{1}{2}$  h.p. motor and with 7 in. x 1 in. wheels. Complete information and prices will be supplied by the manufacturer.



Jobs come fast—when you've got "26" playing ball on your side! This new 26 piece set packs all the toughness of "Superrenches" plus the exact sockets and attachments needed for garage and general service work.

Includes 18 Standard 12-Point "Supersockets"; — 13 Regular Straight Wall, openings 7/16 to 1"; 5 Extra Deep, openings 11/16 to 1-1/8". These, with 8 Drivers, including Reversible "Superratchet" and Universal Joint make quick work of the average repair job. In strong steel case.

Write for literature of the complete Williams line including all types of wrenches, pliers, screw drivers, chisels and punches.

**WILLIAMS**  
SUPERIOR DROP-FORGED TOOLS  
"SUPERSOCKETS"

J. H. WILLIAMS & CO., "THE WRENCH PEOPLE", 225 LAFAYETTE ST., NEW YORK, N.Y.  
WESTERN WAREHOUSE & SALES OFFICE: CHICAGO • WORKS: BUFFALO

## Finds Used Tire Sales More Than Profitable

Used tires pay the rent and light bill each month for Roy E. Sollenberger, one of the most successful independent service station operators in Dayton, Ohio. Sollenberger has a metal display rack out front, always showing 25 to 30 good looking trade-ins. Constant hammering among his customers disposes of a never-ending stream of these used tires at a good profit.

Average tire on Sollenberger's rack is priced at \$4.00. These tires are taken in at \$1.50 and \$2.00 apiece. If a trade-in tire has a good carcass, but with tread worn down, Sollenberger sells the tire to the retreaders at \$1.00. If the tire is not worn too much, he regrooves it and paints it. All tires displayed are cleaned up and painted before being put on the rack. This is important.

Here is a frequent deal: Sollenberger takes in a set of four for which he allows \$9.00. The tires are cleaned up and painted, put on the rack and sold for \$20.00. On this second deal Sollenberger gets three tires with carcasses good enough so that he can sell them to the retreaders at \$1.00 each. Thus he gets \$14.00 out of the whole transaction.

Sollenberger says he makes about as much off his used tires as he does off new ones, and he does an outstanding job in new tire selling!

### Gas Hose on Reel

If you're within 12 ft. of the gas pump you're close enough, if it's a Bowser pump. For the new models of Bowser gas pumps, made by the S. F. Bowser & Co., Inc., Fort Wayne, Ind., are equipped with a 12 ft. hose on a reel inside the pump housing. The reel is the retrieving type, and winds up the hose as simply as a window shade.

### Legally Speaking

(Continued from page 18)

the amount due. Commenting on this phase of the case the Court continued:

"The acceptance of goods by a buyer will be presumed after their receipt and lapse of a reasonable time for examination. If he exercises his right to reject them, he must do so not only promptly but unequivocally. The retention of the goods in this case for an unreasonable time after their receipt barred the buyer from claiming that a bona fide dispute existed respecting payment therefor. The seller was clearly within his legal rights in accepting and cashing the check. The acceptance of the check did not bar the right to recover the balance of the account."

### Those High-Powered Words

ONE word in a contract may mean a gain or loss of thousands of dollars to the repairman who is a party to the transaction. It depends upon the meaning given to the word. This business of having the meaning of a word in a document defined by

a Court is what is called "interpretation"—and thereby hangs the profit or loss!

Very often the interpretation of a word or phrase in a contract determines whether one of the parties to it is to receive certain money, or, on the contrary, make a certain payment. Usually, as a Maryland Court recently pointed out, the words in a contract are to be understood in their plain, ordinary and popular sense. Yet, there are instances where it would be unfair to interpret a word in a contract in its ordinary meaning because the word may have acquired a special or technical meaning in the

trade or business to which the contract applies. In such a case, the Courts will interpret the word according to the meaning which it may have acquired by the usage of trade.

It isn't always possible to anticipate the importance that the meaning of a word in a contract may subsequently assume, but where it can be seen at the outset that the rights of the parties may depend upon the meaning ascribed to a particular word or phrase, safe practice is to define in the contract itself the sense or meaning in which such a word or phrase is understood by the parties themselves.

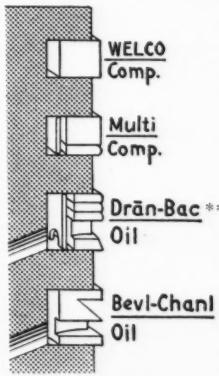
## Puts a Wallop in every cylinder!



## “Dran-Bac ‘H’ Sets”

Every Piston Packs

### a Punch When "H" Sets Are Installed!



\* Rolled Tin Finish Aroloy segments

\*\* Licensed under Patent to Phillips, No. 2148997

**Dran-Bac** "H" Special Sets challenge the field for equal ring-for-ring efficiency. Equipped with the sensational Dran-Bac Oil Rings and Multi-Compression Rings, "H" Special Sets "pull no punches" when it comes to stopping oil pumping and compression loss. Their flexibility, multiple wiping edges and the glove fit action forced by their Swedish steel expanders stop oil pumping and compression loss in cylinders that are often worn far beyond the taper range of many other rings.

### Hard on Oil Pumping, Easy on Cylinder Walls

While Dran-Bac Oil Rings and Multi-Compression Rings are unusually efficient in re-ring jobs they are NOT hard on cylinder walls. With the Aroloy segments in these rings cylinder wear is not a factor because Aroloy is EASY on cylinder walls.

Insist on Dran-Bac "H" Sets. Cost no more . . . often less! Ask your Jobber or send for name of nearest jobber and literature.



# WEL-EVER

THE  
WEL-EVER  
Piston Ring Co.  
TOLEDO, OHIO

# Finance and Service Cars Boost Business

## Pennsylvania Shop Profits by Effective Merchandising Scheme

Starting from scratch eight months ago, the Gordon Garage, Allentown, Pa., developed its repair and service departments so rapidly that six employees are kept busy handling 400 cars a month.

The unusually rapid development of this general garage business is attributed to an aggressive merchandising plan which provides for financing of repair jobs, a car for the customer's use while his own car is in the shop, outside solicitation for repair

work and a guarantee that every job must be satisfactory.

According to A. C. Leibensperger, owner-manager, about 30 per cent of the major repair jobs are sold under a finance plan. Financing arrangements are made according to the customer's ability to pay. After definite arrangements for payment have been made the customer is asked to give the car title to the garage, where it is held until the account is paid.

"We do all our own financing," he

said, "and for that reason can make any reasonable arrangements with the customer, which we could not always do if we were to do the financing through a third party. In arranging for payments on a job, we are careful not to overload a customer. If a man can easily pay \$2 a week, we will rather have him pay that much than to ask for \$5 a week, which would be a burden. If credit is asked for by a customer who does not have a clear title to the car, we first check through the local credit association to determine whether to accept the risk.

"In quoting the price for a repair job to be financed, we figure a flat rate which includes labor, parts and financing, so that the customer doesn't have to bother about each individual charge. We usually add about 6 per cent to labor and material costs as a carrying charge.

"Our losses on financing have been less than one-half of 1 per cent, and we believe that a reasonable time payment plan is one of the best methods to bring a large volume of repair business to the general garage. Successful operation of the plan requires that one man in the office checks accounts constantly and reminds customers immediately if payments are not made on the due date."

Another plan that has brought much business to the Gordon Garage is the offer to furnish the customer with a car while his own car is being repaired. When the customer objects to a repair job because he needs his car every day, he is advised that the garage has a car available for his use as long as his own car is in the shop.

While some cars must be held for several days to complete major repairs, in most cases the jobs are finished in a day. For instance, if the customer brings his car to the garage in the morning, he is furnished with a car and asked to return the following morning for his own car.

The Gordon Garage has seven cars that are always available for service. Some of these are the personal cars of the owner and his assistants. But all of these cars will be given to customers under the plan in use here.

To avoid possibility of liability on the part of the garage when a customer has an accident while driving its car, all cars are fully covered under a garage liability insurance contract, with added endorsements to cover the liability of customers when using one of the garage-owned cars.

While it seldom happens that all seven of the service cars are in use, it is not unusual for four or five to be in use day after day. Two of the service cars are of the sedan delivery type, and by having these ready for call the Gordon Garage has developed a nice business among owners of light delivery trucks, such as bakers, butchers, confectioners, florists, etc., who often have only one truck and are glad to patronize the garage which will furnish a truck for business purposes.

One man is constantly employed for outside solicitation. He follows up owners of commercial cars to get their business on motor repairs, fender and body repair work and lubrication work. Owners of cars damaged in accidents are also contacted, and this salesman always has enough

(Continued on page 69)

## A Complete Work-Bench beside every job . . .

There's no need for wasting time running from the job to a work-bench located at some far corner of the shop. Do as many wide-awake repair shops are doing . . . install one or more

### "HALLOWELL" Semi-Portable STEEL WORK-BENCHES

They are real steel work-benches with a smooth working surface. Move like a push cart so they can be taken to any part of the shop where they're needed. Bring tools, vises, etc., within easy reach. Strong welded construction insures long life. They're steel, so they're fireproof.

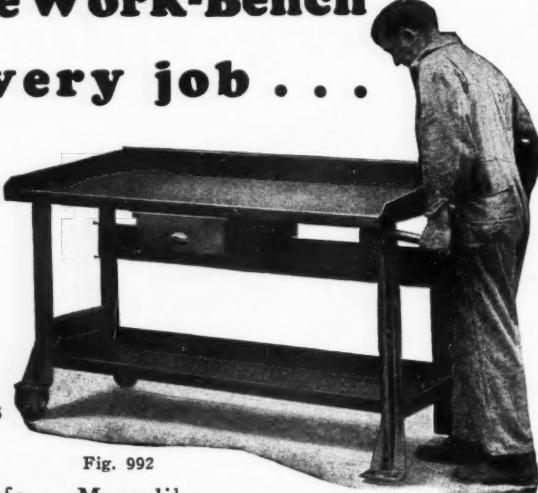


Fig. 992

Drawer is extra

### "HALLOWELL" STEEL TOOL STANDS

A stand where tools can be safely kept under lock and key, yet always visible. Extremely convenient and a real favorite in hundreds of shops.



Fig.  
1112

Get all the facts, now, about these three labor saving products.



Fig. 732  
Pat'd. and  
Pat's. Pending  
Drawer is extra!

### "HALLOWELL" STEEL WORK-BENCH

Strong and rigid, its welded construction keeps it that way. Smooth steel top can't splinter or get oil-soaked. Over 1300 different combinations to choose from . . . there must be one to suit your requirements. Surprisingly low in cost.

## STANDARD PRESSED STEEL Co.

BRANCHES

BOSTON  
DETROIT  
INDIANAPOLIS

JENKINTOWN, PENNA.

Box 561

BRANCHES

CHICAGO  
ST. LOUIS  
SAN FRANCISCO

# RELIABLE

## DEVELOPS NEW OVER-SIZE FLOOR JACK

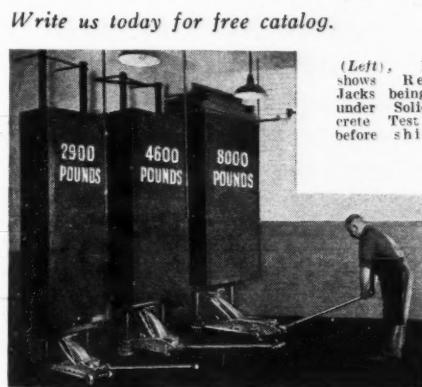
**AUTOMATIC two-speed pump increases speed of operation, yet lifts maximum load easily**

The new RELIABLE NO. 2HF FLOOR JACK (shown at left) is a heavy, oversize two-ton jack designed for the general requirements of the garage or service station where "dollying" is not the prime consideration. The two-speed pump requires only one, two or at most three strokes to engage saddle with the load, at which point the high pressure pump takes over—AUTOMATICALLY.

Only 3 of Reliable's 34 models are shown here.



No. 2HF with automatic two-speed pump and 2-ton capacity. Range of lift  $4\frac{1}{4}$ " to  $22\frac{3}{4}$ ". Overall length of jack and handle 80 inches.



(Left), Photo shows Reliable Jacks being tested under Solid Concrete Test Blocks before shipping.

Compare this RELIABLE NO. 2HF with other so-called two-ton jacks. The RELIABLE has 25% MORE WEIGHT which means greater SAFETY and ability to stand long, hard use.

Every RELIABLE NO. 2HF is tested under Solid Concrete Test Blocks for load and lift before leaving factory—your guarantee of receiving full, rated capacity.

Write us today for free catalog.



(Above), No. S-71 Hand Hydraulic. In 11 sizes ranging from  $1\frac{1}{2}$  to 12 ton capacity



No. 1-HR Hydraulic. Has detachable handle for use in Service Car.

**RELIABLE JACK COMPANY, 1401 W. Second St., DAYTON, OHIO**

*It's a fact!*  
**PROFIT SALES**  
*Every day*



The SS-11 Service Stock, illustrated here, is the finest in ignition merchandising. It contains generous assortments of coils, brushes, rotors, contact points, and other electrical items so that the dealer can service over 90% of all cars, including latest models.

Cabinet is of sturdy steel construction, built to fit the dealer's individual business. Shelves may be interchanged or extra shelves may be added to meet the need for additional space. This cabinet cannot be outgrown.

Coils, condensers, distributor heads and other items are packed in neat, heavy stock cartons that will not crumble under weight.

Merchandise that is attractively displayed will step up any dealer's turn-over and bring more profit sales into his cash register every day.

WRITE FOR FULL PARTICULARS.

**C. E. NIEHOFF & CO.**

4919 LAWRENCE AVE., CHICAGO, ILL., U.S.A.



### FLEXIBLE IDENTIFICATION LAMPS

Model No. 500



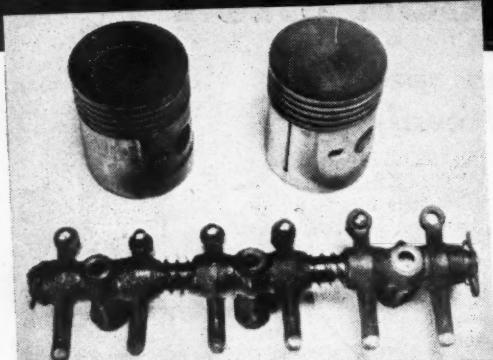
For V-Type roofs and streamlined rounded-end truck and trailer bodies. THREE  $2\frac{1}{2}$ " beehive lenses mounted on a steel strip, housed in extruded, long-lived rubber. All wires concealed. Patent applied for.

**Write for details**

Members by Invitation—Rice Leaders of the World Association

**The K-D Lamp Co.**  
CINCINNATI, O.

# Why Pay for Heat You Don't Need?



Here's what Magnus No. 78 can do. Note the cleaned piston and the cleaned part of rocker arm at right.

## GIVE IT A REAL TRIAL FOR 30 DAYS

Let us send you a drum of Magnus No. 78. See what it will do for you. If you are not completely satisfied at the end of 30 days, send back the unused portion for complete credit on the entire drum.

Hot tank cleaning may be needed on some of your jobs, but if you can do any appreciable part of your cleaning in a cold tank, you can cut big slices out of your cleaning costs, particularly where your work is intermittent.

## MAGNUS No. 78 in COLD Tanks

is quick and thorough. No brushing or scrubbing. Just drop the part in the solution, soak and rinse off with clean water. Removes not only oil and dirt, but also takes off lacquer, carbon, soot, grease, paints and similar coatings.

### MAGNUS CHEMICAL COMPANY

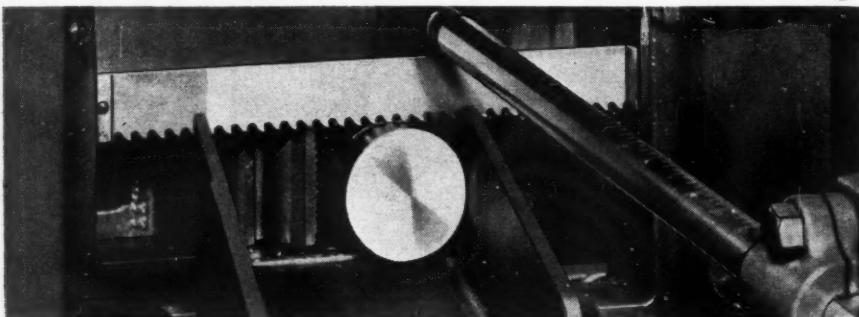
Manufacturers of Cleaning Materials, Industrial Soaps, Metallic Soaps, Sulfonated Oils, Emulsifying Agents and Metal Working Lubricants.  
36 South Avenue

Garwood, N. J.



## MAGNUS CLEANERS

# Atkins Makes Hacksaw History



Atkins Super-Power Blades are available in two tooth spacings: No. 400 for rounds up to 5" or equivalent square stock; No. 500 for rounds (or equivalent) over 5".

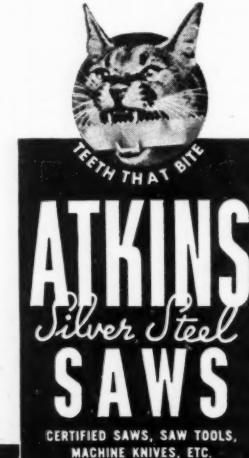
CONSTANT laboratory research by Atkins has produced another hacksaw sensation. Fourteen years ago the same metallurgists gave you the silver steel blades today asked for everywhere as "Atkins Blue Ends."

Atkins Super-Power blades No. 400-500 are now announced — just as revolutionary in 1939 as the amazing performance of Blue Ends in 1925. They have had every practical test and can be unqualifiedly offered to cut longer and straighter than any other. In our tests on 3" round chrome nickel molybdenum steel bars so many cuts have been made as to wipe out all previous test records.

Teeth are formed to take a chip which is really a shaving, voided easily by the new gullet design. That's why heavier feeds can be employed. Patented set permits a two-way clearance and a free cut without friction.

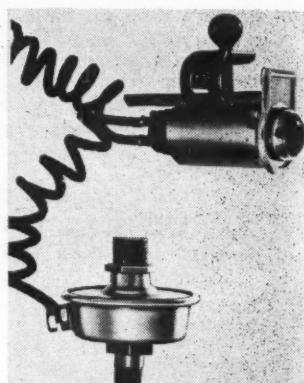
Send your jobber a trial order. Ask for Atkins "Red-White-and-Blues."

E. C. ATKINS AND COMPANY  
423 S. Illinois St. Indianapolis, Ind.



## Red Light Warns of Oil Trouble

No guesswork about it—if there is trouble in the oiling system the Safe-T-Eye flashes a red light on the instrument panel. The light flickers first, and then if the trouble gets worse it burns with a steady glare. The device consists of a control unit which is installed on the oil pump or oil line, and connects to the instrument



board light through a simple connection on the ignition system. The light itself may be installed either directly on the instrument panel, or can be clamped on with a bracket. Write Pressure Signals, Ltd., Elmhurst, Ill., for complete information.

## Back-Up Light

Can you see where you are going, when you back up? The K-D Lamp Co., 610 W. Court St., Cincinnati, Ohio, has announced two new back-up lights to provide ample visibility when backing.

One, Model No. 859, illustrated, is diamond-shaped, with 4 1/8 in. x 5 1/2 in. crystal lens. It has an off-set bracket for bumper mounting and is available in chromium finish or in black enamel with chromium door.

## Linco Announces

### New Items

The Linendoll Corp., 813 North Franklin St., Chicago, Ill., has announced new additions to its line of service station equipment:

A pressure washer for washing wheel bearings under pressure, removing oil, grease, dirt and foreign particles:

A pressure packer for lubricating the wheel bearing after it has been cleaned, requiring no special fittings:

A metal display cabinet for mounting the pressure packer, and containing the pressure washer:

A gun loader — a positive acting gear pump for filling hand and power grease guns direct from the drum:

A canned oil dispenser which pierces the can and holds the spout in place, in one operation.

For complete information regarding these items and others in the Linco line, write the manufacturer.



## ALL WAYS

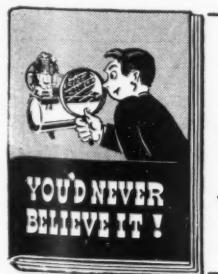
• Made only of the best materials . . . by modern methods, exclusive with this company . . . Gardiner Acid-Core Solder assures the dependable results, maximum economy and consistent performance so important to car manufacturers, body builders, garages and repair shops.

Its quick-acting flux permits fast, clean work. Unusually high tensile strength insures lasting bonds. Yet Gardiner Solder costs less than "nameless" solders that lack its advantages of high quality and dependability.

The Gardiner quality line includes Acid and Rosin-Core Solders, Solid Wire, Bar and Body Solders . . . also Permanent Lining Babbitt metal. For best results . . . always and all ways . . . specify Gardiner-made products.



4839 S. Campbell Ave., Chicago, Ill.



WRITE FOR  
BOOKLET  
ABOUT  
WAYNE AIR  
COMPRESSOR  
ECONOMY  
THE WAYNE PUMP  
COMPANY  
Fort Wayne, Ind.

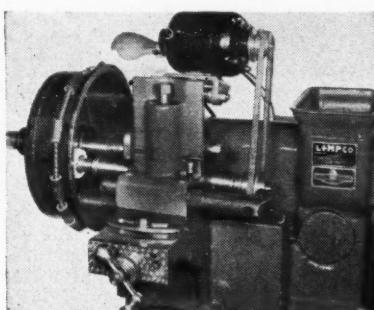


### RUNNING WATER

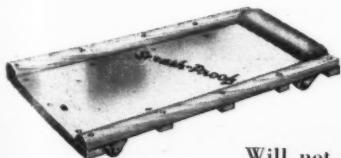
One of the luxury features of the new streamlined Auto-Union car shown at the 1939 Motor Show in Berlin, Germany, is the built-in wash basin with running water located behind the right front wheel. When not in use the basin folds up to form part of the fender.

### Brake Drum Grinding Attachment

Filling a demand for a speedy and efficient brake drum grinder, Lempco Products, Inc., Bedford, Ohio, announces the production of a new grinder attachment designed to fit all brake drum truing machines which they now have on the market. Both cutting tool and grinder wheel are



mounted on a split head, each tool being swiveled into position for the separate operation. Change from cutting to grinding is said to require about thirty seconds. Complete details are contained in a new catalog which will be supplied upon request.



Stocked by  
More Than  
1000 Jobbers

**HULBERT CREEPER CO., ASHTABULA, O.**

Will not smash when run over by cars or light trucks. Hardwood construction, bolted and screwed together. Will not wrack loose or come apart. Have the strength of the most expensive metal creepers, yet the comfort, low price and light weight of wooden creepers.

LOOK WHAT THE  
"KING" 200 TESTER  
with  
EXHAUST GAS ANALYZER  
has to offer  
You



THE  
"KING"  
MT-200  
with  
EXHAUST  
GAS  
ANALYZER  
**\$240.00**

SOLD ON  
DEFERRED  
PAYMENTS

In order to get the most Tester for the money it will pay to check performance and price. Many who have done this claim that the "KING System" of Motor Tune-up offers the most for the money. The "KING" MT-200 with Exhaust Gas Analyzer is a bargain at \$240.00—and in other makes it will require a much more expensive Tester to do what it does. It will soon pay for itself in any shop. Here are a few of the tests it will make: Exhaust Gas, Coils, Relays, Generators, Fuel Pump, Carburetors, Ignition, Spark Plugs, Condensers, Cut-outs, Voltage Regulators, Timing, Ground, Continuity, Cables, etc.

**R.P.M. Indicator \$ 37.50**

The NEW "KING" Electro-Tach (or R.P.M. Indicator) simplifies timing of the ignition, carburetor adjusting, setting governor, voltage regulator, and cut-outs. It saves time and enables you to do a better tune-up job. After proper tune-up it will indicate increased R.P.M.



**New two-meter Armature Tester  
Indicates "SHORT" and "GROUND"**

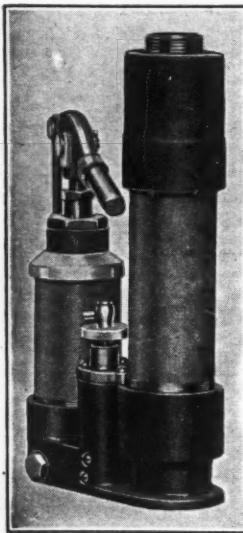
The "KING" KA-4 Armature Tester has two meters, one to indicate "shorts" and one to indicate "ground." A 110-volt circuit is usually used for making ground tests, but quite often an armature is passed as good and later develops

trouble when put back in service. This is due to lack of voltage and to overcome it we have incorporated a step-up transformer which develops sufficient voltage to positively indicate on the meter if armature is grounded. Often a slight ground can be "burned out," thereby correcting the fault. This New Armature Tester will save a lot of trouble in any shop.

Ask your Jobber or Write us Jobber's Name  
The ELECTRIC HEAT CONTROL CO.  
9123 INMAN AVE., CLEVELAND, OHIO  
KING Good Products Since 1914—KING

# PERFECTION POWER A PLUS HYDRAULIC JACKS

- Power in both push and pull.
- Operation in any position, even upside down.
- A pump which will fill 100% with any amount of handle travel.
- A swivel handle which allows jack to be operated in any position.
- This jack will do everything which all other jacks heretofore have not done — and more.
- A self-contained universal operating jack.



**G.A.C. MFG. COMPANY**  
ASHLAND, OHIO



Increase your driving safety as proportionately as four wheel brakes over two wheel brakes.

Sound Range: 1 to 10 Miles  
New Remote Controlled Spot Light  
Ready. Avoids drilling car body.

Write for Literature

**BUELL MANUFACTURING COMPANY**  
2983 Cottage Grove Ave., Chicago, Ill.

## Factory Smoke

(Continued from page 50)

a youngster between the ages of 10 and 15 you might see how good an "advisory engineer" you can be when it comes to building a "gravity" racer.

\* \* \*

Last month the Canton, Ohio, plant of Timken Roller Bearing Co. held open house for four days in order that employees' families and friends might see what goes into the making of a bearing. Nearly 15,000 people took advantage of the offer to visit the plant. Nearly all manufacturers welcome visitors either at specified times or at any time. If there's a parts or equipment manufacturer in your neighborhood it would be well worth your time to pay a visit. A better understanding of the parts and equipment you handle every day may help you in your business.

\* \* \*

While you're visiting the plants keep an eye on their housekeeping methods—you'll find no Scotch housewife was ever more frugal with scraps. Last year the car factories saved about \$11,500,000 just in salvaging binnings, turnings, sheet clips and other waste. Maybe you can use the same methods on a smaller scale in your shop.

\* \* \*

Curtis Callow, sales engineer of the refrigeration division of Waukesha Motors Co., has predicted air-conditioned automobiles will be on the market within a year. He asserts that equipment now being developed will provide adequate refrigeration for ordinary five-passenger cars, and that the conditioning unit will occupy a space of only about 15 cubic inches.

## Heavy Duty Stop Light

Trucks, buses and trailers require a heavy duty stop light, and here's one

announced by Do-Ray Lamp Co., 1458 South Michigan Ave., Chicago, Ill., supplied with either angle mounting bracket or for flush type mounting. Has 5 in. lens.

## Ford Tractor Preview

A preview and private demonstration for the press of the new Ford tractor was held in Dearborn on June 29. As MOTOR AGE went to press no details of the tractor were available.

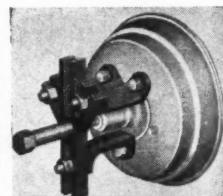
**ALL-MISCIBLE**  
The Only Brake Fluid Engineered  
Expressly for  
**REFILL**  
**USE**

PURITAN  
HYDRAULIC  
BRAKE  
FLUID  
REGULAR

We are telling  
**40,000,000 MOTORISTS:**  
**EVEREADY PRESTONE**

TRADE-MARKS  
**ANTI-FREEZE**  
**Costs More by the Gallon...**  
**LESS by the Winter**  
**WILL YOU CASH IN?**

**UNDER ANY  
PULLING CONDITION**



You'll find more efficient operation by using the Springfield 500. Pulls hard-to-get-off gears, wheels, hubs, etc., quickly and easily. It's all 1929 to 39 cars. No extras to buy. Write your jobber or direct.

only \$7.50 delivered  
**SPRINGFIELD WHEEL PULLER**  
SPRINGFIELD WHEEL PULLER COMPANY, SPRINGFIELD, OHIO

For running-in new and rebuilt engines use auxiliary lubricants containing "dag"\*\* Brand colloidal graphite.

**Acheson Colloids Corporation**

Port Huron Michigan

\*REG. U. S. PAT. OFF.

FOR THE OIL GASOLINE & WATER CONNECTIONS  
**VELLUMOID**

**Cut or Tap Out Gaskets  
As You Need Them**

No delay—every VELLUMOID Gasket is a Quality Product which you can rely on.  
THE VELLUMOID CO., WORCESTER, MASS.

## Boost Business

(Continued from page 58)

leads to keep him busy. He is employed on a salary basis and his service costs approximately 5 per cent of the gross volume he brings in to the garage.

The selling methods developed for use inside the garage pay particular attention to the more profitable kinds of work. As many as six wax and polish jobs are done in a day because car owners are sold on the idea of having a real polishing job instead of spending money for makeshift jobs from time to time.

Leibensperger also offers the privilege of a monthly charge account to commercial and professional people who have a good credit record. He finds that when a customer has a charge account it is easier to sell him additional services and accessories.

"There is a definite place for good salesmanship inside the garage," he asserted, "and it is often a matter of sales suggestions that converts an unprofitable customer into a buyer who will return us a profit.

"However, in building up sales on a charge account we use discretion. There are times when it is easy enough to build up a customer's monthly account to the point where he may find it difficult to pay us. We usually decide at what point to stop using sales talks during a certain month, making a note to add those extra sales during following months."

### Air Tankers

Bigger payloads with greater safety are assured trans-Atlantic mail planes with the development of the flying tanker for refueling in mid-air at the rate of 1,000 gallons in 10 minutes.

Aerial refueling will add 7,000 pounds to the payload, it is estimated, by enabling planes to take off with a reasonable fuel load which can be increased in the air. A plane taking off at a weight of 46,000 lb. can, by means of this system, have its weight increased to 53,000 lb. before it starts its ocean crossing.

Flying tankers, as scheduled for use, are converted bombers, twin-engined monoplanes. The tanker maneuvers into position above the mail plane and a rubber pipe line is connected to the tank which is to be filled in the mail plane. With this system, a flying tanker, can, if necessary, supply trans-Atlantic aircraft with all the fuel needed for the crossing, except for an hour's supply which is aboard when the ocean-flying plane takes off. On weekly flights this summer, planes will receive 960 gallons of gasoline in transit, it is planned.

### Motorized Cycles

Veteran cyclists may be interested to learn that the latest type of vehicles seen on the roads in France are motorized "bicycles built for two."

For some time bicycles equipped with tiny engines, called "velomoteurs" have been used. Manufacturers have now gone a step farther and are building tandems with motors. The engine acts as an auxiliary so as not to deprive the operator of all his fun and exercise.

Write  
to  
Motor  
Age  
Clearing  
House  
for  
Service  
Help



### Announcing

A new Key Chain License Holder. Hunting, fishing and driver's licenses are protected in non-inflammable, moisture-proof case which fits securely on car key chain. A genuine Sinko product. Your regular customers will snap up money-making new accessory item.

List Price 15c Each

**SINKO TOOL & MFG. CO.**  
351 N. Crawford Ave., CHICAGO, ILL.



**"WE SAVED 10 DAYS LABOR  
IN ONE MONTH'S TIME  
with a LEMPCO Portable  
Crankpin Grinder"**

That's a lot of time — and a lot of money — to save in any shop. Yet it's just a typical report from shops all over the country that have installed Lempco Crankpin Grinders.

How can any machine save so much time? Just watch it operate once and you'll learn the answer. In a couple of hours you can do the work that ordinarily takes a couple of days. Instead of pulling the motor you merely drop the pan, quickly and accurately grind one or all crankpin journals and the car is ready to roll again.

A catalog giving all the details is yours for the asking. Mail in the coupon today.

**SEND FOR FREE CATALOG**

Time is money to me. Send me a catalog giving complete information on your new Portable Crankpin Grinder.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_

**Lempco Products, Inc.**  
Bedford, Ohio

# BALDOR BALL BEARING GRINDERS

They WON'T BURN OUT



Ruggedly built. Ball-bearing. Capacitor type motor protects against burn-out. Weight, 39 $\frac{1}{2}$  lbs. Guaranteed 1 year \$20.50

BALDOR ELECTRIC CO.  
4375 Duncan Avenue  
ST. LOUIS, MO.

DON'T FILE POINTS!



### Flexible Contact Dresser

- Takes the hardest of Tungsten Points.
- Bends in where a file can't reach.
- Cleans and Dresses all Electrical Contacts.

Ask Your Jobber or Write Direct  
BINCK-McILWAINE, Inc., 16 Hudson St., New York



TRADE MARK  
**NO-C-OUT**  
HOSE CLAMPS

THE HOSE CLAMP WITH THE THUMB SCREW  
Seals absolutely against leakage of anti-freeze radiator connections, or heater hose. Type A. Adjustable, the clamp with the thumb screw, fits many. Type GHG for heater hose. Type GBB for booster brakes.

WITTEK MFG. CO.  
4305 W. 24th Pl., Chicago, U.S.A.

### Royal Auto Wash

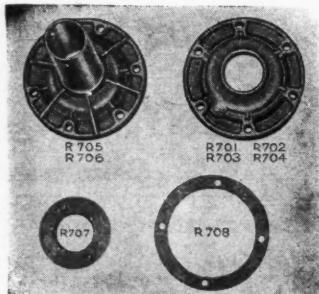
Gone is the streaky wash job, when Royal Auto Wash is used. One ounce to the usual 12-qt. pail of water, sponged over the car and then rinsed off—dries quickly and without streaks, says the manufacturer. Does not foam nor bubble, and will not harm chromium, enamel, Duco or lacquer. For complete information write the Royal Automotive Products, 28 Front St., Brooklyn, N. Y.



"Listen wise guy, I said 'hand over your jack!'"

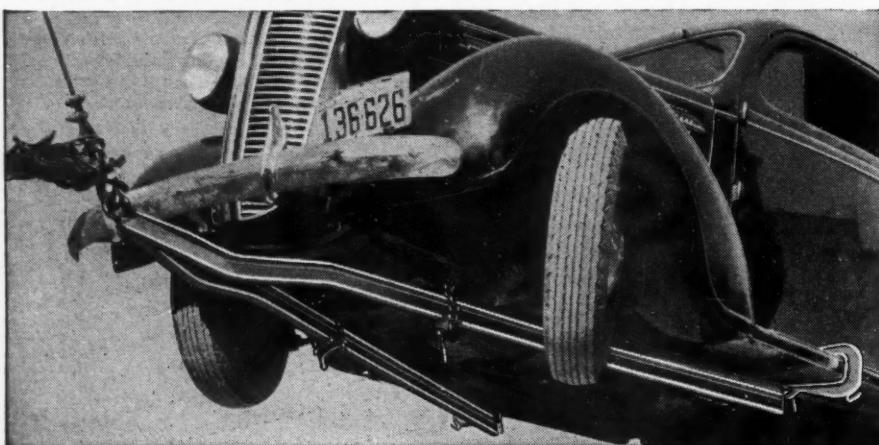
### Gaskets for Chevrolet

A complete line of retainers and gaskets for Chevrolet main drive gear bearing is just announced by Supco Products Corp., 109 West 64th St., New York City, making the line available through the jobber for the first time. The set-up includes all passenger cars and trucks from 1931 to 1939, 3- and 4-speed transmissions. Write the manufacturer for complete information and prices.



### Gas Blow Torch

Heat where you want it—up to 2250 deg. F.—and in a needle-point flame so the heat will be concentrated on the spot. That's what you get with the new Johnson hand blow torch introduced by the Johnson Gas Appliance Co., Cedar Rapids, Iowa. Ideal for light brazing, battery work, radiator repairs, soldering, auto body repairs and lead burning. Priced at \$7.00, less 20 per cent, cash with order.



PARCO MFG. CO., 111 2nd AVE., PEORIA, ILL.

### SOLID STEEL HEAVY DUTY



One piece 20 gauge steel with rolled edges; braced with wrought iron members; massive, wide-tread, ball-bearing casters riveted to stay. Price \$4.50.

National Machine & Tool Co.  
Jackson, Mich.

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Guaranteed for two  
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### L. S. Maremont

L. S. Maremont, 63, one of the original founders of Maremont Automotive Products, Inc., died at his home June 8 after a long illness.

Mr. Maremont was associated with the automotive spring business since its beginning—being instrumental in building the firm to one of the largest of its kind in the industry.

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